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THE ROLE OF CAPITAL MARKETS DEVELOPMENT IN ECONOMIC GROWTH AND RISK MANAGEMENT: THE CASE OF SELECTED AFRICAN DEVELOPMENT BANK MEMBER COUNTRIES

A dissertation submitted in partial fulfilment of the requirements of the Royal Docks Business School, University of East London for the degree of

MSc FINANCE AND RISK

MAY 2015

[13026 words]

I declare that no material contained in the thesis has been used in any other submission for an academic award

Student Number: u1344567 Date: 11/05/2015

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ABSTRACT

Purpose – The aim of this dissertation is to examine the role of capital markets development in the economic health of the African development Bank (AFDB) regional and non regional member countries. Also to evaluate how the stock market indexes located in those countries manage their market risk and volatility. This paper combines various econometric models for a thorough analysis.

Methodologies / Approaches – This study uses time series and panel data designs to find out whether stock market development influences economic growth, explaining the exact nature of this relationship. It also uses delta-normal Value at Risk and GARCH (1, 1) approaches in order to determine the stock indexes risk and volatility.

Results – The finding shows the evidence of finance-led growth in most countries (with the exception of United Kingdom and Cote d'Ivoire) since there are one or several significant variables. Therefore we accepted the null hypothesis for these two countries and rejected for the eight the other countries. Nevertheless, the results have highlighted the significance of Market capitalization (size proxy) and turnover ratio (liquidity proxy) to the economic growth in most cases. The risk and volatility tests conclude that Japan, Brazil, South Africa, Egypt and UK have the most volatile and riskiest stock indexes.

Recommendations – The key goal of African governments is to create suitable environments by establishing efficient and flexible regulations to motivate foreign investments, prioritising domestic awareness about financial services and creating a stable political climate to make investments possible.

Value / Originality – This dissertation performs an array of econometric models on two African markets' major concerns.

Keywords: Capital Markets, Stock Markets, Economic Growth, Value at Risk, GARCH, Time Series, and Panel Data.

1.0 – INTRODUCTION

Capital markets are markets designed for equities, debts and derivative products trading, where governments and firms raise long term funds. Capital markets comprise two distinct markets: primary markets which are expected to deal with newly issued securities and secondary markets which deal instead with the trading of previously-issued or existing financial instruments. Capital markets are indispensable in providing investors with diverse investment products, allowing them to select the best risk-return level for any opportunities. Consequently, capital markets are expected to enhance economic growth by providing a boost to domestic savings and increase the number and value of investments. Under well governed rules and regulations, capital markets promote the expansion of alternative financial tools such as: pension schemes, mutual funds and insurance. These tools not only contribute to an increase in saving rates but also enable investors to hold diversified portfolios, which in turn facilitate the flow of capital to higher return projects thereby boosting up financial growth and employment.

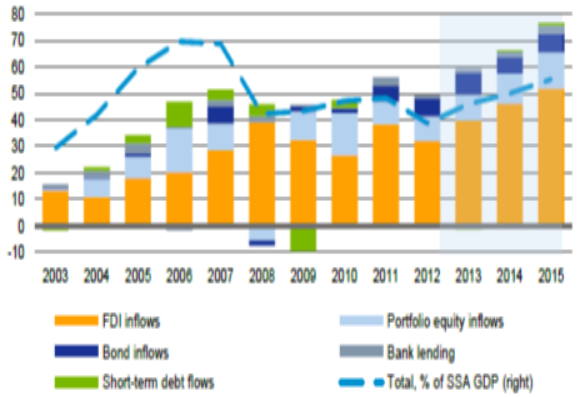
The same vital progress predicting the coming of institutional financial investors in emerging economies in the 1980's is currently taking place in Africa. Over the period from 2000 to 2007, African capital markets recorded a noticeable improvement, which has made them more attractive to foreign investors. The reasons that might explain such growth are:

- African equities have benefited directly from excess global liquidity, this has sustained the appetite for risk ;
- several African nations have recorded low interest rates and inflation because of the decline in many commodity prices, their economic interests are oriented towards Asian markets and debt relief;

- The promotion of sovereign credit ratings for countries on the continent has started, and economic and political reforms that have taken place across the region thus encouraging investors both inside and outside Africa to invest into African enterprises.

Africa had known excellent economic growth prior to 2008. Economic experts were optimistic about its capacity to generate the necessary resources for the development and poverty reduction. Unfortunately, this glimmer of hope was interrupted by the financial crisis of 2008–2009, which has less affected the banking system compare to occidental countries. Financial markets, commodity prices and capital inflows in Africa have been impacted. (See figure 1).

Figure 1 – Private capital inflows in SSA in $US bn



Sources: World Bank, IMF quoted by Masetti and Mihr (2013)

For instance, banks located in countries like Madagascar, Mozambique and Swaziland where foreign banks holding 100 per cent of share have terribly suffered from the contagion effects of that crisis as the headquarters of those banks are based in Portugal, France and the United Kingdom. The financial trouble experienced by the parent banks on the other hand, has had the opposite effect on their subsidiaries in Bank of Africa Benin or Standard bank of Ghana, which have seen their stock market capitalization increase over the period 2008–2009. Likewise, currency fluctuation has been noticed in many countries, especially against US dollar and Euro. It was the case of

Zambia Kwacha exchange rate that dropped by 50 % against US dollar. The financial turmoil has also taken a heavy toll on African countries dependent on natural resources. For example, in Burkina Faso, the export of cotton has drastically declined from 2007 to 2008. Also, oil producer countries have registered a serious drop in the price of crude oil. In those different cases, the utilisation of derivatives could have been helpful, but, this option is almost inexistent on the continent. The other effect of the crisis is the sharp decrease of FDI at about 21% (African Development Bank, 2009).

Accessing capital markets is a new trend in the African continent that is being facilitated by quantitative easing (QE) policies undertaken by advanced economies central banks (US Federal Reserve, the Bank of England and The bank of Japan) to moderate the impact of the last financial crisis. Central banks purchased government bonds and mortgage-backed securities from banks and other private institutions in order to inject money into the economy. This decision generated an excess of liquidity and made securities less affordable in those advanced countries. Then, investors are looking for alternative investment universes. Emerging countries seem actually to offer better yields. As a consequence, private capital inflows, including FDI, debt flows (i.e. bonds and banks lending) and portfolio equity flows experienced significant increases. According to Ncube (2014), the African Development Bank's vice president, many countries in Africa issued sovereign bonds for the first time under favourable conditions: Ghana issued $750 million at 8%; Gabon $1.5 billion at 6.38% yield; Rwanda $400million at 6.88% yield and Nigeria $500 million at 6.63% . As we can see, QE encouraged bonds issuance of African countries on global financial markets.

There are controversial debates regarding the impact of QE on African capital markets. Although, the monetary policy has enabled several African nations to issue their first sovereign bonds, the next step of that policy could affect the continent in one way or the other. Indeed,

"Tapering" is the contrary of QE which consists of withdrawing the QE. Already, we have witnessed the depreciation of South Africa's exchange rate. Some experts argue that South Africa is the most vulnerable due to its economic features.

Despite all the significant strides made in the past decade, African bourses are underdeveloped in comparison with other emerging markets. This is a constraint to economic growth. In fact, with the exception of Johannesburg stock exchange, the other stock markets are small and illiquid. Issues such as transparency, lack of technology and small amount of IPOs are all contributing to ineffective and ill-equipped equity markets across the region.

Secondly, African bond markets have steadily been growing in recent years, but remain at the nascent stage (apart from South Africa). Sub-Saharan debt markets are dominated by short-term government securities, with the activity concentrated on domestic primary markets. In reality, local currency both are almost inexistent with the market capitalization of 14.8% (both corporate and government bonds) which is lower than similar emerging countries. (International Monetary Funds, 2012). Although many countries have listed bonds, secondary market is virtually inactive. This situation is mainly due to the " buy and hold" strategy applied by local banks that hold the bulk of the debt, the lack of lending opportunities and the inability of countries to establish an effective benchmark for the pricing of corporate bonds.

Thirdly, most African countries have no derivative markets with the exception of South Africa and Northern economies such as: Egypt, Tunisia and Morocco where the number of derivative transactions is minor but increasing. Where those markets are represented, they are in their infancy and focused on foreign exchanged instruments, whereas we are aware of their ability to manage risks and fluctuations. Though, most African's revenues come from commodities in general and agriculture in particular. So, derivative tools must be included in such operations to prevent risks. Yet, equity and bond markets have to be

efficient to make this possible. On the other hand, one common issue with derivative is its misuse which may lead to risk amplification mainly when regulations in place are not well-organized.

It is true that African financial system is dominated by banking sector, and capital markets seem to be incompetent, even nonexistent whereas, previous studies have demonstrated the correlation between financial markets development and diverse aspect of the economic system such as investments, fiscal policies or risk diversification, etc. in various countries. This dissertation is among the nascent literatures that analyse the role of capital markets development in general, and the equity markets in particular on financial growth and risk management. The paper illustrates the controversial theories surrounding capital markets development and the real impact of stock markets development on the economy. The paper also makes notes of the current situation of African financial markets and the barriers that inhibit their evolution.

The paper proceeds as follows. Chapter 2 presents an overview of existing literature about capital markets in general and stock markets in particular and a general picture of their role in the development of African countries. Chapter 3 outlines the time series, panel data, delta-.normal Value at Risk and GARCH (1,1) methodologies for a deep analysis of stock markets and their risk management. A out-sample of 7 African countries, 2 industrialised countries and 1 emerging country will be evaluated in detail in chapter 4. Finally, chapters 5 and 6 will provide the conclusions to the study as well as listing some valid recommendations.

2.0 – LITERATURE REVIEW

2.1 – The necessity of Capital markets development

For the record, capital markets encompass equities, debts and derivative products on these underlying assets. These markets have a significant part in promoting national development and that through

both primary and secondary markets. In primary market, organisations and governments spread financial instruments representing claims against their future cash flows and use these to reach broader regional and international savings pools for financing themselves. Conversely, secondary markets are more accessible because they give investors the opportunity to discover the accurate valuation of securities and be sure they are fairly compensated for the risk they take. In this area, the entire responsibility is to liquidity suppliers, as they take advantages of assets' mispricing as well as investors' behaviour against risk. To make all of this possible, the market has to be large and deep because a deep market is not only about increasing liquidity, it also means a well-functioning secondary market which is the most important from the investors' viewpoint.

At the international level, Bekeart et Al (2005) demonstrated that equity market liberalisations drive at least one percent point of additional economic growth in those nations that have set them up in the late 20th century; providing that national debt remains at acceptable level (less than 35% of bank deposits). Undoubtedly, the growth of bond markets place an upward pressure on stock markets and provide a basis for other capital markets development. Even though some viewpoints argue that developing countries are the ones who take the most advantage of such reforms, the reality is that the effects depend on how much supplementary investment markets can be released and how fruitful this investment can be. Afterwards, only the nations holding the greatest-quality financial establishments benefit the most. For example Bekeart et Al (2005) move their analysis forward noting that countries with the highest-quality establishments obtain three times the advantage from liberalisation than those with low-quality institutions, while countries with stable regulatory background which gives investors confidence tend to get four times the benefit than other do.

Furthermore, another benefit of developing capital markets in emerging economies is the possibility to diversify firms and

governments' sources of finance. This ability to diversify can create a faster and secure economic development by ensuring that shocks to the supply of bank credit won't have a unbalanced result on that growth.

2.2 – Theories surrounding Capital markets development

Different studies have been carried out by financial economists on the implications of financial markets development for diverse aspects of an economy. One line of research doubt the crucial value of financial systems for the economic growth while others stress the role of financial sectors in capital allowing, activating savings and adequate liquidity and easing risk management. Moreover, some theses provide a theoretical basis for the belief that the more efficient the capital markets, the better the economy. This review seeks to examine the existing literature about the impact of capital market development on economic growth in general and portfolio management in particular. We will explore several academic reviews and give a special attention to African countries.

Robison (1952) argues that financial system does stimulate economic growth since the growth itself might be activated by development in the real sector. In this vein, many studies elaborated by authors like Meier and Seers (1984), Stern (1989) and even Lucas (1988), (the 1995 Nobel prize-winner) show that the financial system is not correlated to the economic growth or even if there is any link, this is not significant. Besides, Demirguc-kunt and Maksimovic (1996) study which consists of a mix of developing and advanced nations from 1980 to 1991, highlight diverse issues. Basically, in developing countries, banks see capital markets as competitors because they think those markets will reduce their market shares, whereas, the study found that there is a positive link between bank development and leverage and a negative correlation between stock market development and leverage. But, when the full sample has been divided into sub-sample, a positive relationship with leverage came up. Stock market development in already developed countries leads to a switch of equity for bond financing. This effect is

felt differently in developing countries. Adversely, large firms become more leveraged with stock market improvement, while small businesses are not really affected by the market development. In reality, stock market development implies a higher debt-equity ratio for firms and also for banks. Hence, the results suggest that in countries with developing financial factors, stock markets and banks play a complementary role in the economy. Through the banks' activity, it is possible to look at the amount of credit going into non-financial entities, pension funds and insurance companies; all financial intermediaries are involved in the process. As a matter of fact, countries with well developed capital markets tend to have well developed financial channels.

The perspective of stock market expansion is given through the analysis of Demirguc-kunt and Levine (1996) applied on a sample of both developing and industrialised countries. This challenging work looked at different measures of capital markets such as: volatility, liquidity, concentration, size, institutional development and integration in order to test the correlation between them. They finally discovered that nations with developed stock market are less volatile and more internationally integrated than smaller markets; nations with markets focused in few equities tend to have less liquid, less internationally integrated and more volatile markets. Also, countries that provide strong information disclosure laws are likely to apply international accounting standards and have larger and more liquid markets. Eventually, the development of stock markets seems to affect the entire economy.

In their investigation about the link between stock market development and long-run growth with cross-country regression, Levine and Zervos (1996) relied on previous studies from Atje and Jovanovic (1993), Levine and Renelt (1992) as well as Levine and Demirguc-kunt (1996). The theory uses stock market indexes that consist of stock market trading, size and integration in order to gauge

the strength of the relationship. From the evidence, they found a positive relationship between stock market development and long term growth after controlling the measure of monetary, fiscal and exchange rate policies, the initial level of GDP per capita, political instability and also the initial investment in human capital. This optimistic standpoint is contested by Stigliz (1985) and Shleifer and Summers (1988) that agree that stock market expansion might hurt economic growth by simplifying counterproductive corporate takeovers. Likewise, Devereux and Smith (1994) draw attention to the fact that risk sharing through international integration can reduce saving rate and, then slow down the economy. Nevertheless, well-functioning stock markets may contribute to corporate control and subsequently lead to better managerial competency. Greater firm management and corporate control will, in turn, encourage investment and efficiency. Yet, in presence of stock market that offer the opportunity for switching from low to high risk and vice versa, investors can invest confidently. Therefore, risk-sharing through international integration is not harmful in itself since it improves resources allocation.

Regarding the African stock markets development and economic growth, Tachiwou (2010) explored the relationship between stock market development and financial growth in West Africa Monetary Union for the period 1995-2006. The model uses two stock market liquidity and size indicators with Engle and Granger's approach to demonstrate that stock market development is a crucial determinant of West Africa's economic growth. Foreign Direct Investment (FDI) and Human Capital are the two independent variables that show the positive correlation with growth in West African Monetary Union. Additionally, a paper written by Adjasi and Biekpe (2006) on 14 selected African countries has shown the need for stock markets development for lower income countries in particular that might take financial advantages of that market.

In their investigation in the role of stock development in Nigeria, Alajekwu and Achugbu (2012) found that market capitalization and value traded ratios have a weak correlation with economic growth while turnover ratio has a very strong correlation with the economic variable.

Levine (2005) argues on the ability of capital markets development to facilitate risk management. There are three types of risks to take into account: liquidity risk; intertemporal risk sharing and cross-sectional risk diversification.

Cross-sectional risk diversification described in corporate finance stipulates that developed financial markets may ameliorate risks linked with individual projects, firms, industries, regions and countries. In other words, financial institutions, mutual funds and securities markets all make means available for pooling, trading and risk sharing. In fact, riskier projects tend to be associated with higher returns. Therefore, investors can diversify the risk by inducing a portfolio shift towards the riskiest projects (Patrick (1966)). In the same logic, Acemoglu and Zilibotti (1997) showed the evidence of the correlation between cross-section risk diversification and financial growth. They demonstrated that the fact that agents hold diversified portfolios of riskier projects encourage a restructuration of savings into greater-return ventures which impacts growth because, basically, great-returns and risky projects require a large amount of initial investment. People try to avoid risk, without financial arrangement that allows diversified portfolios holding, people will miss the opportunity to receive higher returns.

In addition, financial markets may enhance intertemporal risk sharing. Allen and Gale (1997) highlighted the role of capital market on financial intermediaries and concluded that risks cannot be diversified at some point of time, but over generations. Only long-lived intermediaries can ease risk sharing by investing with a long-term perspective and offer returns that are relatively low in boom times and relatively high in slack times.

Liquidity risk comes from the lack of speed in securities trading to prevent or reduce loss. Liquidity risk arises when an individual or business with immediate cash needs, hold a valuable security that cannot be sold or trade because of the lack of buyers, or even because the financial market is inefficient, it is difficult to bring buyers and sellers together. Also, transaction costs and informational asymmetries may restrain liquidity and deepen liquidity risk. Liquid capital markets allow investors to hold liquid securities that they can easily and quickly trade to access their money. Simultaneously, those liquid financial tools are transformed in long-term investments by capital markets.

Stock market may also help to reduce liquidity risk. Many investors are aware that the equity market is a volatile area to invest their money. Stocks price varies at several points within a short period of time since it is likely to react to news events related to oil, geopolitics, monetary flows, interest rates and expected corporate earnings. Despite the risk involved, stocks provide higher returns than bonds and constitute the most popular asset in portfolio investments.

In a liquid stock market, investors can readily trade their shares as capitals invested by previous savers are available. In this way, stock market liquidity is likely to mitigate downside risk and costs of investing in short or medium term projects.

In contrast, critics highlight the disadvantages of having liquid stock markets. According to Bhide (1994), liquid stock markets might discourage investors to hold long term securities, as they can easily trade them in the market. Consequently, investors fail to meet their commitments to companies they are engaged with, which lead to uncomfortable corporate issues.

There are huge discrepancies between stock market volatility in developing countries and advanced ones. Harvey and Bekeart (1996) analysis on emerging stock market volatility show that:

- The volatility in advanced countries is about 18%, while it can reach 86% in emerging countries. Also, the development of stock market and the degree of market integration can lower volatility. The evidence has been proven with Mexico, Brazil, Taiwan and Portugal.
- In completely integrated markets, volatility is due to world factors, whereas, it is influenced by local factors in non-integrated markets.

The advantage of knowing about risks is that we can change our behaviour to avoid them. Yet, we optimise our reaction and especially our investment preferences, to maximise rewards and minimize risks. In practice, volatility plays an important role in pricing securities, risk management (value at risk, also in asset allocation under the mean-variance framework). For estimating market risk, the concern is that there is array of methods. Berkowitz and O'brien (2002) analysed the VaR approaches used by some leading US financial institutions and discovered that their results were inaccurate since; they had experienced higher losses that expected. Jorion (2005) stated that despite the diverse VaR models in existence, any model correspond to a particular case, depending on the type of variables and distributions we are dealing with. Caporin (2003) found that EWMA is also able to provide constant volatility models for VaR forecasting. However, the most common models used remain the ARCH-GARCH models and their substitutes. Hansen and Lunde (2005) compared different volatility models on exchange rates data and IBM stock price and concluded that none of them were better for forecasting than the GARCH model.

2.3 – African capital markets

Interest in emerging economies increased in the early 1980's, as financiers became progressively attentive to the impressive growth among some Asian countries. So far, African countries have been often difficult to access, situated in war-torn areas, or subjected to economic sanctions. Additionally, portfolio investments were low in African debt and equity markets due to their lack of depth and liquidity. Indeed,

various studies conducted over the past years have highlighted the strong positive relationship between capital markets development and economic growth in Africa. Fauver et Al (2003) reported that countries with high level of financial growth have powerful capital markets. Furthermore, it is easier for them to obtain overseas funds. In absence of well-functioning capital markets, funds become expensive to raise and, that leads to liquidity and financial transparency concerns.

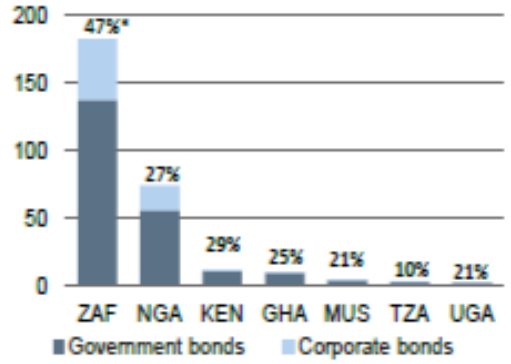
Bond markets

Mu et Al (2013) emphasized that bond markets spur financial stability. In fact, the Asian economies experience after the 1990s crisis has supported this point, since these nations have been able to fund their fiscal stimulus packages by strengthening their debt market. African bond markets are still at their nascent stage which makes the entire continent dependent of foreign grants and other financial supports in order to finance capital and government spending whereas deeper debt markets could have helped improve African financial system, intermediation of savings and led to effective monetary policies.

Even though most studies in Africa are focused on Stocks and banking system, Adelegan and Radzewick-Back (2009) applied a panel data analysis of 23 African debt markets. They figured out that for corporate debt a positive correlation exists between exchange rate variability, fiscal balance, no capital control and domestic bank credit while GDP per capita and interest rate variability are negative. For government debt, exchange rate variability, investment profile, no capital control and fiscal balance were all positive and significant while interest rate variability and bureaucracy quality were negative and significant.

In Africa, debt trading level is still low because, government bonds are the most use while there is less heterogeneity amongst countries regarding corporate bond markets since the market capitalization is low whatever the country. Nonetheless, South Africa continues to dominate the continent with 47% of market capitalization ratio. (See figure 2):

Figure 2: Domestic bonds market capitalization ratio in $US bn, for South Africa, Nigeria, Kenya, Ghana, Mauritius Tanzania and Uganda.



Sources: World Bank, IMF, quoted by (Masetti and Mihr, 2013)

Before 2010, government bonds market capitalization recorded a drop from 18.7 % in 2006 to 14.1% in 2009. On the contrary, corporate bonds increased steadily from 5.1% to 10.8% between 2006 and 2010.

Blommestein and Horman (2007) provide a clear picture on actions made to improve emerging and African countries debt markets through the Organisation for Economic Co-operation and Development (OECD). The article focuses on the need of legal framework and debt strategies developments for Africa. Besides, problems such as the small number of listings, the lack of long-term maturity and suitable yields curves or benchmarks and also the low number of local currency bonds have been emphasised.

Overall, the development of bond markets in Africa seems to be a crucial source of finance which could help the region to be financially independent and drive to the economic growth.

Banking sectors

The fact that Africa's financial system is mostly guided by banks is argued by Beck and Cull (2013). The paper describes the current situation of the banking sector across the continent. Africa's banking sector is centred mostly on short-term yield of curve. Also, the insignificant demand of financial products such as: insurance, education and pilgrimage loans, mortgages and savings in some countries are the reason for lack of competitively within the sector.

Indeed, most Africans do not have banking and saving culture. They often choose for example to keep their savings in their houses or workplace or even take part in traditional tontines (a form of investment between a group of friends where each subscribe the same amount of money within a time period and redistribute the saving between each other. The saving is kept by one group member.) Rather than keeping the money in a bank account. If the banking sector is still struggling to flourish in some countries, the major factors remain the lack of population awareness of the advantage of banking system and also, the conditions to open up a bank account itself and the subscription conditions to financial services.

It is very common for banks in Africa to ask for many documents for opening an account whereas making this process simple could encourage clients. Moreover, high transactions and other costs related to a bank account and other financial services seem to be non affordable to the majority of population. Beside those factors, it is important to underline the poor customer service in some banks.

Despite this, Africa's 200 leading banks held in 2012 total assets of USD 1,110 billion and a net banking income of USD 45 billion (Derreumaux, 2012). The sector has made substantial progress so far, with technological and financial innovations that have helped broaden the share of population with access to basic formal financial services.

Derivative markets

The advantages of derivatives are multiple. According to Haiss and Sammer (2010), derivatives can pool enormous amount of capital into financial markets, permitting them to take advantage of economies of scale to finance activities capable of yielding higher returns. Derivatives markets can simplify companies' risk management by reducing taxes as well as transaction costs.

Lien and Zhang (2008) argue about the ability of derivative markets to lower country risk and make securities prices.

Initiatives to establish derivatives markets are underway in many African countries including Kenya, Nigeria and Zambia. South Africa and some northern African countries are the only SSA countries that have already accommodated derivative markets with trading focusing on currency and interest rate derivatives (9.9% of growth in 2007). Some northern African countries like Egypt, Morocco and Tunisia are also doing well in this field. Adelegan (2009) analysed the development of South African derivatives market and proposed recommendations to its implementation in all sub-Saharan African countries. In addition, the report unveiled the rigorous regulations within insurance and pension funds sectors for higher risks taking limitation, which might impede the expansion of derivatives in South Africa. Establishing derivative markets in Africa appears to be an alternative solution for reducing the continent overdependence on bank credit as main means of funding. Furthermore, there is no need to remember that African economies are based on commodities in general and agriculture in particular, so, there is a vital need to introduce financial instruments like commodities futures or options to mitigate volatility effects.

Conversely, the misuses of derivatives could be factors of financial turmoil, capital inflows acceleration and volatility amplification. Therefore, strong regional cooperation and adequate regulation policies are required.

Derivatives markets can become a tool of development in African capital markets. Countries are encouraged to multiply transactions

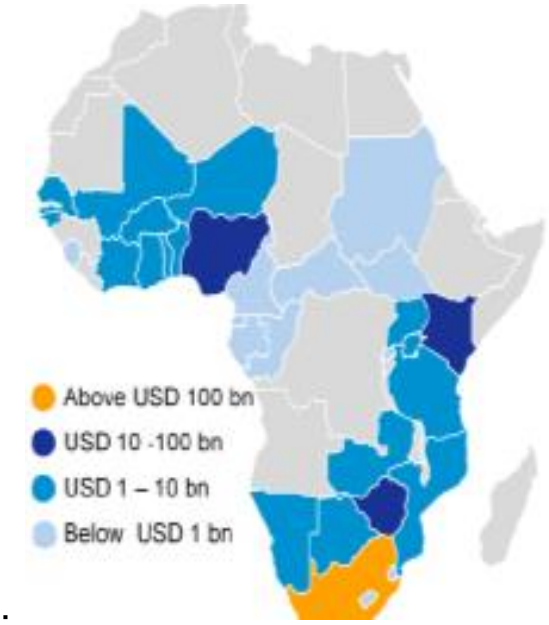
involving derivative contracts in order to boost growth as coinciding launches of new bonds, equities and derivatives will enhance countries' investment opportunities.

Equity markets

Many African equity markets have been recently established. Since 1990, at the end of the cold war, many nations were motivated by international institutions to create these markets as a part of financial globalisation and privatisations promotion. Before that, there were just eight equity markets in Africa with five in Sub-Sahara Africa and three in North Africa. Nowadays, Africa has twenty-three stock markets exchange. The number of equity markets in Africa has increased over the last 10 years and become a crucial part of African countries finance. The reason behind such evolution may be link to the world globalisation, the willing of international trade liberalization and economic growth promotion.

Empirical studies on African stock markets have shown that stocks are very useful for investment financing and growth. According to Mutenheri and Green (2003), equity financing is the key mean of long term finance in Zimbabwe at about 7.8% while bank loans and bonds are almost insignificant. Furthermore, stock markets fund about 12% of total assets growth of listed companies in Ghana (Yartey, 2006).

Figure 3 - Equity markets in Sub-Saharan Africa in 2012



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Source: world Bank, quoted by Masetti and Mihr, (2013)

Equity investments in SSA are focused in South Africa, Nigeria Kenya, Mauritius and Zimbabwe. SA continues to lead the continent.

Despite their problems of small size and low liquidity, African markets continue to grow remarkably well in terms of return on investment. In the same logic, Kenny and Moss (1998) evaluated frequent criticisms of African equity market and the political reforms affecting them. The authors argue that new policy reforms have contributed to create a favourable environment in the markets. Taking the example of Ghana, which in 1989 initiated the program of financial sector adjustment designed to improve banking sector and capital markets.

Today, African stock markets that are considered the most active are:

South Africa: Johannesburg Stock Exchange (JSE) is so far the largest African stock exchange and the 16th biggest in the world, accounted for 38% of listed companies and 83% of total market capitalization in SSA.

Nigeria: The Nigerian stock exchange was originally founded in 1960, with only 19 securities listed for trading. Today, the stock exchange consists of more than 200 listed companies and is the largest West

Africa market and the second biggest stock market in SSA. In addition, its trading activity seems to be less concentrated in comparison with other markets nearby, but most dominated by the financial sector (almost 60% of market capitalization).

Egypt: The Egyptian stock exchange is the oldest African markets as set up in 1883. Nonetheless, its creation took place in two steps: the creation of Alexandria stock exchange in 1883 and the Cairo one in 1903. In this market, trading occurs within three markets: an OTC market, a Primary Dealers Bonds markets and a Listed Securities Market.

Kenya: In Kenya, dealing in stocks began in the 1920's when the country was still under British domination. However, the Nairobi stock exchange was constituted in 1954. The market was listed as the third most active African stock markets in 2014 by the website www.africanbusinesscentral.com (2015) with an average of weekly trade volume of 44,100,000.

Mauritius: The stock exchange of Mauritius was set up in 1988 with two major markets: The Official list and the Over-The-Counter market (for unlisted securities). Over the years, the market has striven to empower the country capital markets until being rewarded the prize of the second "Most Innovative African Stock Exchange of the year in 2012.

Morocco: The Moroccan stock market (The bourse of Casablanca) is one of the oldest North African's markets. Created in 1929, the bourse of Casablanca offers today an improved trading system with accurate information available in international platforms such as: Bloomberg and Reuters to attract foreign investors.

BRVM : Established in 1973, the « Bourse Regionale des Valeurs Mobilières » or BRVM is a regional stock exchange dedicated to the following Francophone West African countries: Benin, Burkina Faso, Guinea Bissau, Cote D'Ivoire, Mali, Niger, Senegal and Togo. The BRVM main objective is to deal with all trading activities within UEMOA.

Although the headquarters are located in Cote D'Ivoire, the electronic trading system enabled the installation of licensed brokers in Senegal and Benin. Trading activities are focused on local companies like Sonatel (Senegalese telecommunication company), and a small part in international banks like Societe Generale, BNP Paribas, Credit Agricole and Citigroup(Piesse and Hearn ,2005).

Nevertheless, Botswana, Tunisia, Ghana and Zimbabwe stock exchange are also classified as being very active.

2.4 – Barriers to African capital market development

No doubt that Africa is on the map for international investors. But, there are several factors that affect its development.

There is a large literature on the constraints faced by African capital markets such as: the lack of infrastructures, regulation and political and economic issues.

Kenny and Moss (1998) described the weak African economic environment, external risk and also political issues as barriers to further capital markets progress.

First of all, the study points out the fact that Africa economic growth is particularly affected by poor soils, limited rainfall, ethnic conflicts, and poor health rates even though the continent's GNP could be compared to that of Australia. Moreover, the region suffers from ineffective financial intermediation and restrictive financial infrastructures, which make settlement procedures difficult in stock markets.

The fragile international monetary position contributes to make debt payment almost impossible. Cote d'Ivoire, Kenya, Ghana and Nigeria have debt export ratio above 200 per cent (World Bank, 1996).

Liquidity problems can be explained by the fact that some markets tend to be run by a couple of large companies (Ghana (90% of transactions controlled by one company), Cote d'Ivoire (75% of

transactions controlled by 5 companies). Some markets are opened for only a few hours per week, which does not allow enough time to complete transactions.

Secondly, Africans are reluctant to invest in domestic markets. Whatever means they have Africans prefer to invest abroad rather than in their local markets. Therefore, compared to the developed ones, African markets have fewer market participants and provide a limited, narrow range of financial instruments with the principle financial role being the provision of the source of domestic funding to compensate government budgetary deficits (Piesse and Hearns, 2005). These issues could be justify by the fact that there is a real lack of population awareness since few schools and universities provide courses related to capital markets.

Most of these markets have limited trading hours and are closely synchronous with other regional markets and there are eventually grave informational and disclosure issues one way or another.

The deputy governor of South Africa Reserve Bank (Mminele, 2013), revealed that African financial markets are dominated by banks and capital markets are still underdeveloped despite their crucial role in the continent's prosperity. Unfortunately, there are huge differences in the size and level of these markets and one of the major obstacles is the difference in legislation applied across the continent. For instance, most African markets are based on poor legislative and regulatory frameworks, often copied exactly from the French code while others use the ones based on the English system. This, among other things explains the lack of legal protection for investors and creditors. Also, some countries have their capital markets strongly ruled by central banks while for others this is the responsibility of the minister of finance or authorities.

The fundamental question of any stock markets is their efficiency. Dickinson and Muragu (1994) conducted some investigations focusing on African markets efficiency using a database of weekly prices over 10

years of the 30 most active Nairobi Stock Exchange's stocks. But they have been unable to find a valid conclusion with weak-form of efficiency by the mean of Q-test statistics. (The weak form of market efficiency states that past information related to stock historical price is fully reflected in current prices and hence technical analysis cannot be used to predict future prices nor earn excess returns). However, they recommended further studies with diverse methodologies in order to make firm conclusions about weak-form of efficiency. Later on, Olowe (1999) found an evidence of weak-form efficiency using joint Q-tests of partial autocorrelation for ten lags in returns data on 59 selected equities' monthly data in Nigeria Stock Exchange from 1981 to 1992. Yet, the author revealed the existence of poor informational flows and information systems that are likely to obstruct efficiency improvements.

There is also a lack of public confidence in the integrity of security markets as a result of distrust of governments and centralized financial institutions. This is due to the assumption that high corruption, nepotism, and banks collapse, failure of corporations and mismanagement of public institutions take place in some African countries.

Nonetheless, regional market integration in Africa is nowadays considered to be a smart process for making securities markets properly work in the continent. Given the importance of financial activities in the development, this approach might create sufficiently close links between institutions, solve liquidity questions, and also enhance global competitiveness. There are 5 dynamic regional markets in Africa: Lagos, for West Africa exchanges, Nairobi for the Eastern region, Cairo for the North and Johannesburg for the Southern Africa Development Community (SADC). If well structured, these markets are expected to solve the existing questions of illiquidity, fragmentation and small size (Piesse and Hearns, 2005).

The concern about the causality effect between stock market development and economic has become a topic of interest for African

researchers since 2000s. Odhiambo (2009) investigated that relationship in South Africa using ARDL-Bounds test over the period 1971 – 2007 and found the evidence of the correlation in short and long terms. In contrast, a different conclusion has been drawn in the same country by Ndako (2009) who used a similar timeline. He states that stock market development does not spurs economic growth, but economic growth spurs stock market development under Vector Error Correction Model (VECM).

Enisan and Olufisayo (2009) showed that stock market development lead to economic growth in South Africa and Egypt. They also found a bidirectional link in Cote d'Ivoire, Morocco and Zimbabwe, and a weak evidence of the correlation in Nigeria using ARDL and VECM models.

African development bank outlooks

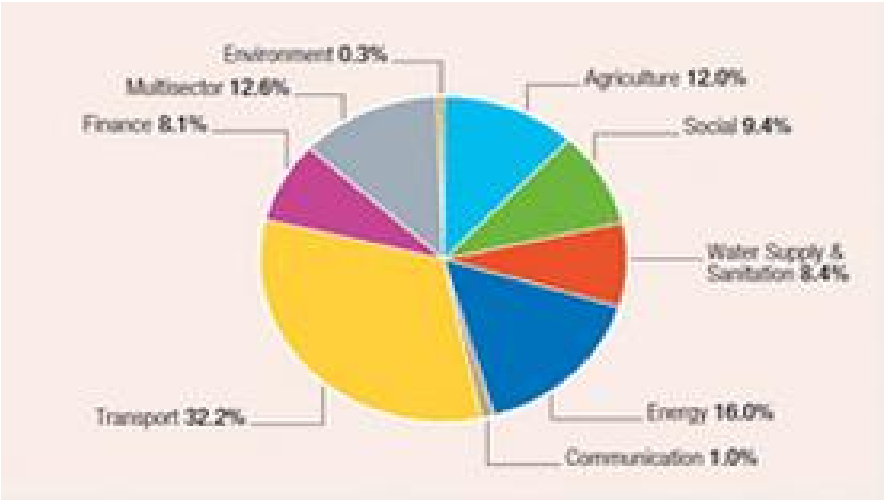
The African Development Bank group is a multilateral financial institution founded in 1964 with the objectives of promoting both economic and social developments, and reducing poverty in African countries. It consists of three main organisations: African Development Bank, African Development Fund and Nigeria Trust fund. Currently headquartered in Ivory Coast, AFDB is increasingly taking the leadership in the region since it is the main financial supplier to governments and private firms willing to invest in the continent. The targeted sectors are: transport, energy, infrastructure, agriculture, finance, water supply and social shared with different parts of the region (see chart).

Regarding the actions undertaken to boost African markets development, the bank launched a couple of projects. The African financial market initiative (AFMI) is designed to establish coherent data that provide updated information related to the market for the improvement and stability of capital markets as well as regional financial integration, and also enhance the availability and transparency of African fixed income data. The African financing

partnership (AFP) is helping mobilizing resources for private sector development on the continent.

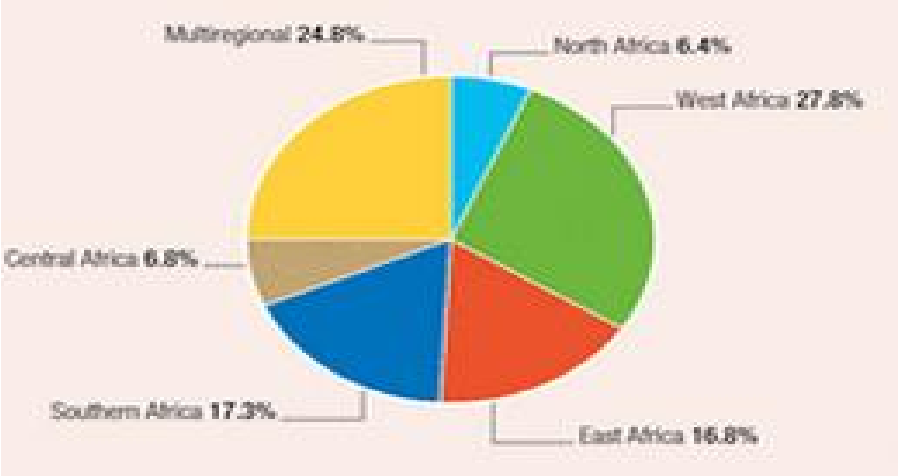
From 1967 until 2013, the bank has funded 4,501 projects amounting to US $118.7 billion. In 2013, the total loans and grants approved by the AFBD across different parts of Africa was as follows: East Africa (UA 597.3 million), North Africa (UA 886.7 million), Southern Africa (UA 615.2 million), West Africa (UA 991 million) and central Africa (UA 243.9 million) We note a decline of roughly 25% from the previous year due to socio-economic disruptions that impacted operations. In addition to that, the bank intervenes directly in specific sector development such as: infrastructure, energy, transport, agriculture, water supply and sanitation, finance, environment and so on. See charts.

Chart 1 – AFDB's loans and grants approvals by sector in 2013



Source: African Development Bank, nd

Chart 2 – AFDB's loans and grants approvals by region in 2013



Source: African Development Bank, nd

The bank is actually formed of eighty one member states, with 54 regional states and 27 non regional states (non African countries).

Regional Member Countries

Algeria – Egypt – Libya – Mauritania - Morocco –Tunisia – Benin - Burkina Faso - Cape Verde - Cote d'Ivoire - Gambia – Ghana – Guinea - Guinea-Bissau – Liberia – Mali – Niger - Nigeria – Senegal - Sierra Leone – Togo – Burundi – Comoros – Djibouti – Eritrea – Ethiopia – Kenya – Rwanda – Seychelles – Somalia – Sudan – south Sudan – Tanzania – Uganda – Cameroon – Central – Central African Republic – Chad – Democratic Republic of Congo – Congo – Equatorial Guinea – Gabon – Madagascar – Angola – Botswana – Lesotho – Malawi – Mauritius – Mozambique – Namibia – Sao Tome & Principe – South Africa – Swaziland – Zambia – Zimbabwe.

Non Regional Member countries

Argentina – Austria – Belgium – Brazil – Canada – China – Denmark – Finland – France – Germany – India – Italy – Japan – Korea – Kuwait – Luxembourg – Netherlands – Norway – Portugal – Saudi Arabia – Spain –Sweden – Switzerland – Turkey – United Kingdom – United States of America –United Arab Emirates.

3.0 – RESEARCH METHODOLOGY

3.1 – Sampling

This study employs secondary data obtained from Bloomberg and World Bank database. The sample consists of ten countries and ten Stock Exchange markets.

The World Bank database provides yearly data for the period 1991-2012 of seven African countries: South Africa, Nigeria, Egypt, Kenya, Mauritius, Cote d'Ivoire, Morocco; two industrialized countries: United Kingdom and Japan and one South American emerging country: Brazil. The study proposes to use the theoretical population of AFDB regional and non regional member countries (industrialized and South America emerging countries) because AFDB is a financial organisation that actually endeavours to fund development projects in Africa by getting finance from local and international financial markets. Stock market development is a multidimensional theory, sometimes measured by stock market liquidity, size, integration and volatility.

The databank comprises: the total of listed domestic companies; market capitalization of listed companies, the total value of stock traded to GDP, the total value of stock traded, the stock traded turnover ratio and the real GDP growth.

- Market Capitalization (MC in current $US): This indicator measures the stock market size. It equals the total value of listed stocks and is relatively linked to the market to attract capital and diversify risk.
- Listed Domestic Companies (LDC): the domestically incorporated companies listed on the country's stock exchange.
- Total value of stock traded to GDP (STR): it quantifies the total value of share traded in the market divided by GDP. This indicator reflects the market liquidity.

- Turnover ratio (TOR): it equals the value of total shares traded divided by stock market capitalization. This ratio is another measure of market liquidity. A high turnover usually indicates low transactions. However, inactive markets will have a significant market capitalization but a small turnover ratio, while an illiquid market will have a high turnover and a small total value traded ratio.
- The gross domestic product (GDP in current $US): Economic growth's measurement.

Given the importance of stock markets in the process, we decided to choose our sample from the same countries used for the regression models but this time, we will look at their stock indexes' risk and volatility. These markets are among the most active African Stock markets. The daily prices for the period 2010 – 2014 will be taken from Bloomberg which is one of the most reliable databank for business and finance researches. The Stock Exchanges involved in the study consist of: EGX30: the Egyptian stock Exchange made of the 30 most highly capitalized stocks; MCSINDEX that represent the 25 most traded stocks and 84% of the total market capitalization of all companies listed in the Casablanca Stock Exchange; NSEAI indicating all the securities on the Nairobi stock exchange; JALSH index, describing the total of all listed companies in the Johannesburg Stock Exchange; NGSEINDEX index, all share traded in the Nigerian Stock Exchange; ICXCOMP index (BRVM) all listed companies on the Regional stock exchange; SEMDEX index (Mauritius) all share traded. For comparison purposes we included non African Stock indexes: FTSE 100 index (UK) the 100 most highly capitalized companies traded on the London stock exchange, IBOV index (Brazil) the most liquid stock traded on the Sao Paulo stock exchange and NIKKEI 225 the price-weighted average of top-225 Japanese companies listed in the Tokyo stock Exchange.

3.2 – Models specification

Model 1: Time series and panel data analysis

In order to examine the question of whether stock markets development spurs economic growth, we used time series and panel data analysis based on Ordinary Least Square implemented in Eviews. Nevertheless, various methods such as Error Vector Correlation Model (EVCM), Autoregressive Distributed Lag (ARDL), ARDL-Bounds or VARs models could have been used instead.

This study is based on the null hypothesis that there is no significant relationship between stock markets development in a country. Hypothesises are formulated as follow:

H_0: Growth ≠ stock ..... (1)

H_1: Growth = stock..... (2)

The paper will be using different equations for better estimations. The empirical specifications are:

$$GDP = \alpha_0 + \beta_1 MCR + \beta_2 LDC + \beta_3 TOR + \beta_4 STR + \mu_t \quad (3)$$

(This equation uses GDP and MC in level and the other variable in ratio).

$$GDP = \alpha_0 + \beta_1 MC + \beta_2 LDC + \beta_3 TOR + \beta_4 TV + \mu_t \quad (4)$$

(This equation uses GDP, MC, LDC and TV in rate and TOR in ratio).

$$GDP\ (rate) = GDP\ (-1))\ (rate) + Log\ (MC) + Log\ (LDC) + TOR + Log\ (TV) + \mu_t \quad (5)$$

(This equation uses GDP and GDP (-1) in rate and the log of other variables).

$$GDP = \alpha_0 + \beta_1 GDP\ (-1) + \beta_2 MC + \beta_3 LDC + \beta_4 TOR + \beta_5 TV + \mu_t \quad (6)$$

(This equation uses all the variables in level except TOR).

$$GDP = \alpha_0 + \beta_1 GDP\ (-1) + \beta_2 MC + \beta_3 LDC + \beta_4 TOR + \beta_5 STR + \mu_t \quad (7)$$

(This equation uses all the variables in level except TOR and STR).

Where MCR is the market capitalization divided by GDP
STR, the total value of stock traded over GDP evaluates the organized trading of equity as a share of the national output (For the other variables definition, see "sampling").
GDP (−1): the lagged dependent variable designs to reduce the bias in sample.
α and β are unknown parameters to be determined while μ_t is the error term.
The paper adopts correlation and regression analysis to find out the exact nature of the link between the dependent variable and independent variables. The correlation between variables is measure by the square root coefficient of determination R^2 that must vary between −1 and 1. So, we must obtain a coefficient ±0.6 to confirm the estimations' success.

After we estimated regression for the 10 countries taken individually, we set them up as a unique panel using the following equations:

$$GDP = \alpha_0 + \beta_{i,t}\, GDP\,(-1) + \beta_{i,t} MC + \beta_{i,t}\, LDC + \beta_{i,t}\, TOR + \beta_{i,t} TV + \mu_t \quad (8)$$

(This equation uses all the variables in level except TOR).

$$GDP = \alpha_0 + \beta_{\,i,t}\, GDP\,(-1) + \beta_{\,i,t}\, MC + \beta_{\,i,t}\, LDC + \beta_{\,i,t}\, TOR + \beta_{i,t}\, STR + \mu_t \quad (9)$$

(This equation uses all the variables in level except TOR and STR).
The same tool of analysis regarding the coefficient of determination R^2 will be used to conclude.

Implementation of time series and panel data analysis in Eviews

- Copy and paste the variables in Eviews
- Check the data's stationarity

- Select “dated-regular frequency” for time series and “balanced panel” for panel data analysis and define the time period.
- Enter equations. (For example: “GDP C MCR LDC TOR STR”)

Model 2: GARCH model and Value at Risk

The primary step of this part will be the calculation of the value at risk using the analytical (also called delta normal approach). Literally, VaR is one of the most accurate methods to measure financial market risk that uses standard statistical techniques. It measures the summary number that quantifies the worst possible loss at a given confidence interval over a specific time horizon. The confidence interval is usually between 95% and 99% and the time horizon could be between 1 day and 1 month.

There are 3 types of VaR approaches: Analytical-Delta Normal VaR; Monte Carlo simulation VaR and Historical Simulation VaR.

In this study, we choose to calculate the Value at Risk with the Analytical-Delta VaR method at both 95% and 99% confidence interval because this approach is great for linear instrument and easy to implement in Microsoft Excel.

The analytical VaR formula for a single index is:

VaR = $-\mu_p + \sigma_P * \alpha$: where;

μ: represents the mean

σ: represents the standard deviation

α: confidence interval (CI)

- we obtained daily returns R_t with the first logarithmic difference for the 10 Stock indexes: R_t = LN (Price /Price $_{t-1}$) to see how much the stock moved between yesterday and today
- Calculate mean μ = average (R_1: R_n)
- Calculate standard deviation μ = STDEV (R_1:R_n)

- Calculate the number of standard deviation α=NORMSINV (95% or 99%). The result should be 1.644 at 95% confidence interval and 2.326 for 99%.
- Calculate VaR. For example $VaR_{(1,95\%)}$= - Mean +Volatility * CI

The advantage of using delta-normal method is that it can also be computed with a large number of assets, because it replaces each position by its linear exposure. Hence, it might be inappropriate for portfolio with non-linear positions such as non-normal distributions and options unless the Monte Carlo approach is used instead. This simulation is fast, accurate and useful not only for its own sake but also because it facilitates the "mapping" rule in risk management.

However, some researchers point out the limitations of delta-normal distribution, especially the existence of fat tails in the distribution of returns on most financial assets. In reality, these tails might be harmful to the risk management process because VaR aims to capture the performance of the portfolio in the left tail. Despite those little concerns, the delta-normal method remains a powerful tool for market risk measurement. (Jorion, 2001).

The second part of this methodology is the application of the GARCH (1, 1) on daily stock prices of the ten Stock Exchange Indexes in order to examine their historical volatility.

The most used models for securities volatility forecasting is the Generalised Autoregressive Conditional Heteroscedasticity model (GARCH) has been initiated by Tim bollerslev (1986) as an extension of the Autoregressive Conditional Heteroscedasticity (ARCH) introduced by Engle (1982). These simulations are based on times series and have become the most important part of econometric models for analyzing a series with time-varying variance. Note that, these models can be used to interpret the historical volatility of a security over a specific period of time. In other words, GARCH models are useful for two mains reasons:

- Prediction: The persistence of the method is a key driver for predictions since it tells how fast the prediction can go to the unconditional volatility. Then, the persistence will be automatically captured by the model. Also, the model is able to predict the average volatility within a period of time (also known as "term structure").
- Simulation: the idea is to use the state volatility to predict the future.

Lest the study would not make any forecasting, the idea is to examine Stock indexes' historical volatility and compare them between each other. So, this document will follow GARCH (1, 1) model for the estimation of historical volatility of daily data. The data collected over the period January 2010 to December 2014 contains different total number of daily price because trading days are different across African Stock Exchange since some of them are only open few days a week.

The basic GARCH (p,q) states that the best predictor of the next period's variance(σ^2_{t+1}) is the weighted average of the long-term variance ; the GARCH term (σ^2_t); a constant term (α_0) another information about the volatility in the current period ; the ARCH term (ε^2_t) and the forecast variance of the current period . The general formula of Generalized – ARCH is:

$$\sigma_t^2 = \alpha_0 + \sum^{q}_{i=1} \alpha_i \varepsilon^2_{t-i} + \sum^{p}_{j=1} \beta_j \sigma^2_{t-j} \quad , \qquad (1)$$

where the term α_0 indicates the long – run average volatility. The GARCH and ARCH are respectively β_j and α_i ; p and q capture respectively the order of moving average and the number of autoregressive GARCH terms.

Then the general formula of GARCH (1,1) is given by (1) and:

$$\sigma_t = \alpha_0 \ \alpha_1 \varepsilon_1 \ \varepsilon^2_{t-1} + \beta_1 \sigma_{t-1} \ , \quad \alpha_0 > 0, \ \alpha_1 \geq 0, \ \beta_1 \geq 0$$

Implementation

- Calculate daily returns from daily prices collected for Bloomberg terminals in Excel. (= LN (price $_t$ / price $_{t-1}$)
- Transpose the returns on Eviews and check the data's stationarity using the unit root testing.
- Estimate the mean equation by entering the name of the stock index followed of "C AR (1)".
- Estimate the variance and distribution by choosing the number 1 in ARCH and GARCH labels and leaving the default "GARCH / TARCH"

Once the method has been executed, Eviews provides a variety of pieces of information and procedures that is useful to have a look at.

- Actual, Fitted and Residual available in forms of tables or graphs
- GARCH graph such as conditional variance and standard deviation
- Residual Tests

4.0 – DATA ANALYSIS

4.1 – Results and discussion of Time series and Panel data analysis

One of the aims of this dissertation is to examine the nature of relationships (if any) between economic growth, the dependent variable (GDP) and stock markets development, the independent variables (MC or MCR, LDC, TOR, TV or STR) during the period 1991-2012 for seven regional member countries and three non-regional member countries of AFDB.

The time series analysis of countries taken individually gives the consecutive results:

Note that the equations (3), (4) and (5) have been inconclusive due to the fact that, all R^2 calculated were about 0.2 and 0.4 and F-statistic greater than 5% whereas these indicators explicit the success of any regressions.

In regressions (6) and (7), we added the lagged dependent variable GDP (-1) between the independent variables. The lagged dependent variable increases the value of R^2, Durbin-Watson statistic and lowers the value of F-statistic. Conversely, equations (6) and (7) show better results than equation (3), (4) and (7). To interpret the results obtained, we must look at:

- R-squared (R^2) statistic that captures the success of the regression in forecasting the value of the dependent variable. Usually, we take 60% or more. (Mandatory).
- P-values for each variables that should not be more than 5%
- Probability (F-static) explains the significance of the all regression which should not be more than 5%. (Mandatory).
- Durbin-Watson statistic used to test the presence of serial correlation among the residuals. According to the Thumb, residuals are uncorrelated if the Durbin-Watson statistic is about 2. (Mandatory).

The results of this study fit the recommendations listed above. In any cases $R^2 \geq 0.6$; F-statistic ≤ 0.005 and Durbin-Watson ≈ 2. These are the results for each country:

Brazil

The regression 6 shows that only stock total value is positively correlated and significant. Listed domestic companies and turnover ratio move in the opposite direction with GDP while market capitalization is positively correlated with GDP. In regression 7, only listed domestic company moves in the opposite direction with GDP. None variables are significant to the regression.

There is a weak evidence of stock market development lead growth. Nonetheless, Total value and listed domestic companies are important ingredients in the country growth.

Cote d'Ivoire

In both situations, none independent variables are significant to the test. Nevertheless, they are positively correlated with GDP apart from turnover ratio. (Tables 1 and 2).
We accept the null hypothesis.

Egypt

The regression 6 shows a negative correlation between market capitalization, listed domestic companies and GDP while the correlation is positive between the dependent variable and turnover ratio, total value.
The P-value tests confirm the significance of listed domestic companies and turnover ratio.
Same results are obtained for the regression 7, with the difference that only listed domestic companies are negatively correlated with GDP.
Overall, the variables are significant enough to influence the dependent variable. We reject then the null hypothesis.

Japan

Only MC is positively correlated with GDP (Table 1). Other factors are positively correlated with GDP, but no significant (expect TV).
Table 2 illustrates that market capitalization and turnover ratio are positively correlated and significant with the dependent variable whereas stock traded ratio is negatively correlated and significant. But, none significance has been found between GDP and LDC. The null hypothesis can be rejected.

Kenya

The regression 6 illustrates a strong positive correlation and significance between market capitalization and the dependent variable. Although other independent variables (with the exception of total value) are positively correlated with GDP, they fail to the significance test.
The regression 7 indicates the positive correlation and significance of market capitalization and turnover ratio, positive and negative

correlations for respectively listed domestic companies and total value ratio but, no significance at all. We reject the null hypothesis.

Mauritius

Most of independent variables are negatively correlated with GDP apart from the total value of traded stock, which is the only variable that has been found significant in this regression (table 1). However, none independent variables are significant in the table 2.

We accept the null hypothesis.

Morocco

In regression 6 there is a slight significance for market capitalization only and negative correlation between GDP and turnover ratio and listed domestic companies.

Likewise, MC successes to the significance test in the second case, (regression 7).

Nigeria

The regression 6 displays a positive correlation of market capitalization and listed domestic companies with the dependent variable but, negative correlations of other independent variable with GDP. No significance in the regression.

On the contrary, market capitalization is positively correlated and significant while stock traded ratio is negatively correlated and significant in the test. Moreover, listed domestic companies and turnover ratio have failed to the significance test but, are respectively negatively and positively correlated with GDP. (Regression 7).

South Africa

In the regression 6, all independent variables are insignificant. Market capitalization and Total value are positively correlated to GDP will listed domestic companies and turnover ratio are negatively correlated to GDP.

Market capitalization is positively correlated and significant to GDP whereas total value ratio is negatively correlated and significant.
Turnover ratio and listed domestic companies have respectively a positive and negative correlation with the dependent variable. (Regression 7).

United Kingdom

None variables are significant in both table 1 and 2. Yet, only stock traded ratio and total value are negatively correlated to GDP.
Hence, the null hypothesis may be easily accepted.

Table 1 – Results of regression 6

	MC	**LDC**	**TOR**	**TV**
Brazil	Positive / Insignificant	Negative / Insignificant	Negative / Insignificant	**Positive / Significant**
Cote d'Ivoire	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant	Positive / Insignificant
Egypt	Negative / Insignificant	**Negative / Significant**	**Positive / Significant**	Positive / Insignificant
Japan	**Positive / Significant**	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant
Kenya	**Positive / Significant**	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant
Mauritius	Negative / Insignificant	Negative / Insignificant	Negative / Insignificant	**Positive / Significant**
Morocco	**Positive / Significant**	Negative / Insignificant	Negative / Insignificant	Positive / Insignificant
Nigeria	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant	Negative / Insignificant

South Africa	Positive / Insignificant	Negative / Insignificant	Negative / Insignificant	Positive / Insignificant
UK	Positive / Insignificant	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant

Table 2: Results of regression 7

	MC	**LDC**	**TOR**	**STR**
Brazil	Positive / Insignificant	Negative / Insignificant	Positive / Insignificant	Positive / Insignificant
Cote d'Ivoire	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant	Positive / Insignificant
Egypt	Positive / Insignificant	**Negative / Significant**	**Positive / Significant**	Negative / Insignificant
Japan	**Positive / Significant**	Positive / Insignificant	**Positive / significant**	**Negative / Significant**
Kenya	**Positive / Significant**	Positive / Insignificant	**Positive / significant**	Negative / Insignificant
Mauritius	Positive / Insignificant	Positive / Insignificant	Negative / Insignificant	Positive / Insignificant
Morocco	**Positive / Significant**	Negative / Insignificant	Positive / Insignificant	Negative / Insignificant
Nigeria	**Positive / Significant**	Negative / Insignificant	Positive / Insignificant	**Negative / Significant**

South Africa	**Positive / Significant**	Negative / Insignificant	Positive / Insignificant	**Negative / Significant**
UK	Positive / insignificant	Positive / insignificant	Positive / insignificant	negative / insignificant

The panel data 1 results (regression 8) show market capitalization is positively correlated and significant whereas listed domestic companies is significant and moves in the opposite direction with GDP. (See appendix).

The panel data 2 results (regression 9) show that only Turnover ratio and market capitalization are positively correlated and significant with the dependent variable while listed domestic companies has been found negatively correlated and significant. (See appendix)

The purpose of these time series and panel data analysis was to examine the role of stock market development in economic growth of 10 AFDB's member countries both regional and non-regional. We began by testing countries individually using stock market size (market capitalization and listed domestic countries) and liquidity (turnover ratio and total value/total value ratio) proxies and Economic growth (GDP). The coefficients' sign and the p-value were the two main tools that guided the conclusion. For any independent variables that hold a negative coefficient, it is assumed that if the independent variable increases, this will decrease the dependent variable. Similarly, a drop of the independent variable will increase the dependent variable. The findings are different from one country to another since every country has its own features. Kenya (6-7), Japan (6-7), Morocco (6-7), South Africa (7) and Nigeria (7) have their economic growth positively impacted by market capitalization. This implies that an increase in the size of their stock market will increase the country's economy. Egypt (6-7), Japan (7) and Kenya (7) stock market turnover ratio place an upward pressure on the economy. Total value have a positive influence on Brazil

(6) and Mauritius (6) while total value ratio does not move in the same direction for Japan (7), Nigeria (7) and South Africa (7) economic growth. A decline of the total value ratio will automatically lead to a rise of the economic growth. The listed domestic company is negatively correlated with Egypt (6-7) GDP. After that, we tested the 10 countries as a whole panel using two equations. The panel 1 concluded that the GDP is positively correlated with market capitalization (15.64%), which means the increase of MC will increase GDP at 15.64%, but moving in the opposite direction than listed domestic companies. Regarding the panel 2, we found a positive correlation of GDP with market capitalization and turnover ratio. Turnover ratio strongly impact GDP by 120 E+09 whereas listed domestic companies are negatively correlated with GDP. Stock market development is able to boost the economy. We found that factors like market capitalization and turnover ratio seem to be the most significant. Aside from that, we can also point out other factors that might affect the growth in a good way, such as bond markets development, banking activities, international trades, and flexible policies.

Conversely, concerns like inflation, financial crisis, political instabilities, environmental disasters and the country's risk might place a downward pressure on the economic growth.

4.2 - Results and discussion for Value at Risk and GARCH (1, 1)

When VaR is calculated using delta normal method (known as analytical method), we assume that the returns are normally distributed. Then 5% and 1% VaR on the normal scale, the positions of the VaR are correspondingly 1.644 and 2.326 standard deviations below the mean.

Table 3 - Results of Delta-normal Value at Risk

	MEAN	SD	VAR (95%)	VAR (96%)
IBOV	0.00032	0.01427	2.38%	3.35%
BRVM	0.000523	0.008049	1.27%	1.82
EGX30	0.000383	0.01576	2.60%	3.63%

NIKKEI225	0.000407	0.013836	2.24%	3.18%
NSEAISI	0.000658	0.006656	1.03%	1.48%
SEMDX	0.00015	0.003859	0.62%	0.83%
MCSINDEX	-3.22E-06	0.006485548	0.65%	1.51%
NGSEINDX	2.79E-04	0.009979	1.61%	2.29%
JALASH	0.000486	0.009611	1.53%	2.19%
UKX	0.000172	0.009896	1.61%	2.28%

The table above summarises the means, standard deviations and value at risk percentage of the 10 stock indexes over the period 2010-2014.

Statistically speaking, the mean is merely the arithmetic average used for future returns estimation, while the standard deviation sheds light on historical volatility by giving the level of dispersion. In this sample, Egypt, Brazil and Japan disclose the highest standard deviations (1.57% , 1.42% and 1.38%) whereas Mauritius closed with the smallest one (0.38%).

Likewise, the VaR calculate at 95% and 99% seem to have the same interpretation of the indexes volatility. EGX30 index (Egypt)

, Brazil and Japan are likely to lose the highest percentages of money.

The delta normal VaR model implies that EGX30 index (Egypt) is the most volatile stock index followed by IBOV index (Brazil) and NIKKEI index (Japan).

In many cases, GARCH (1,1) is one of the best models for analysing financial time series and estimating conditional volatility. This section illustrates the results of the model run in Eviews.

Figure 4 - Returns and conditional variance plots

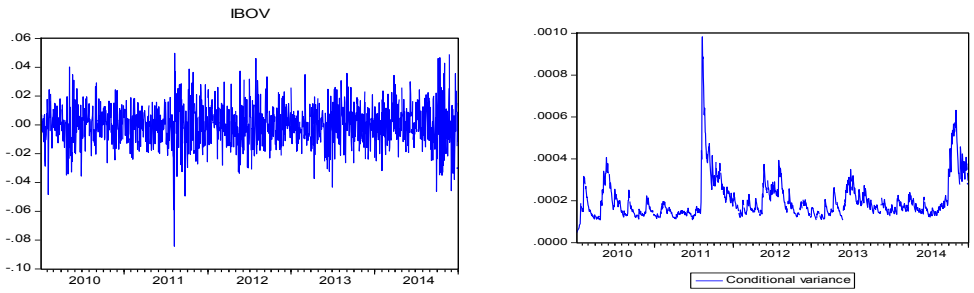


Figure 4.1 – Brazilian stock index: Change in the log of daily index prices and the daily volatility. The period of high volatility is in 2011 and start again in 2014.

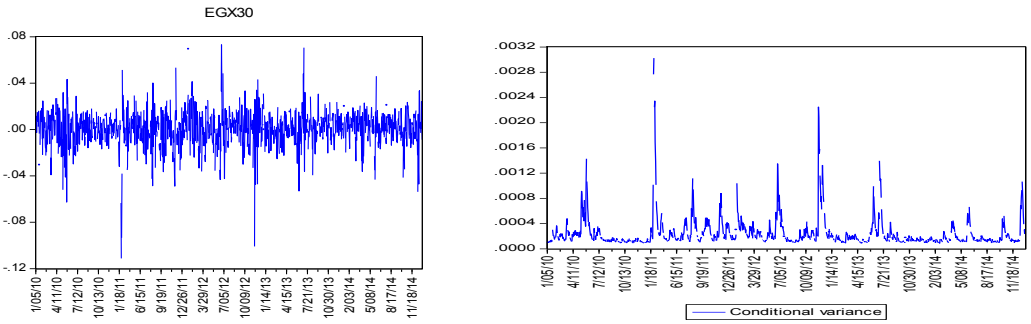


Figure 4.2– Egyptian stock index: Change in the log of daily index prices and the daily volatility. The period of high volatility is between 2011 –2012.

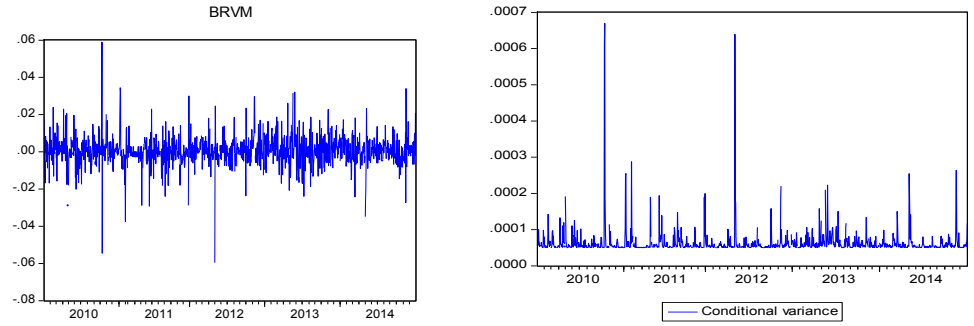


Figure 4.3– BRVM: Change in the log of daily index prices and the daily volatility. The period of intense volatility is between 2010 and 2012.

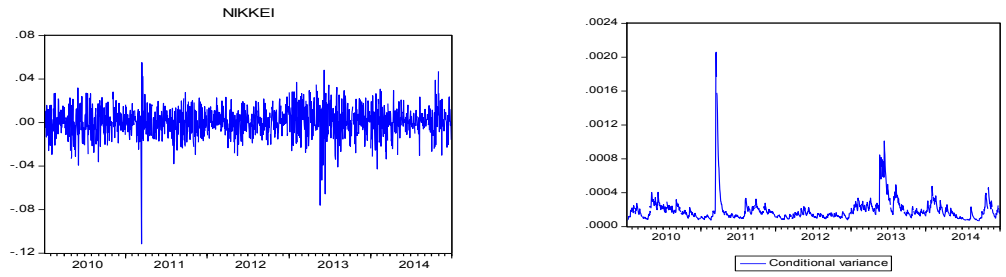


Figure 4.4 – Japanese stock Index: Change in the log of daily index prices and the daily volatility. The volatility is generally high over the period, with some peaks in 2011 and 2013.

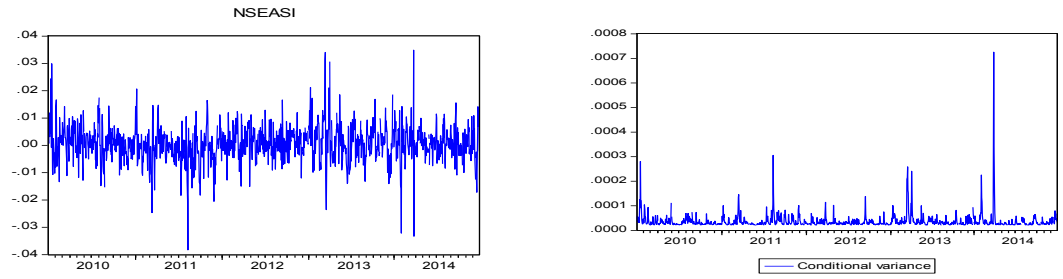


Figure 4.5 – Kenyan stock index: Change in the log of daily index prices and the daily volatility. The period of high volatility is 2014.

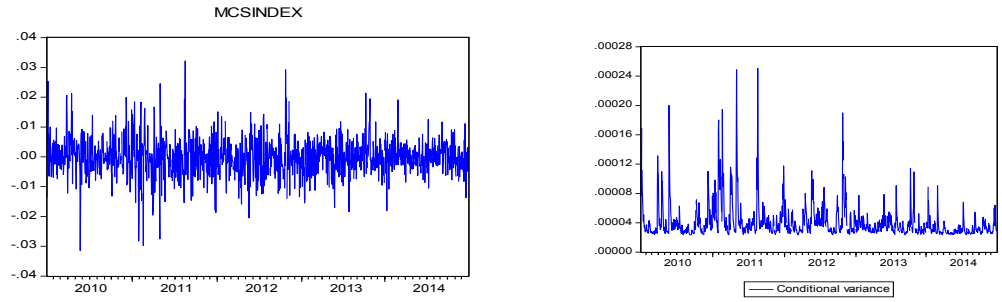


Figure 4.6– Moroccan stock index: Change in the log of daily index prices and the daily volatility. The volatility is significant between 2010 and 2012.

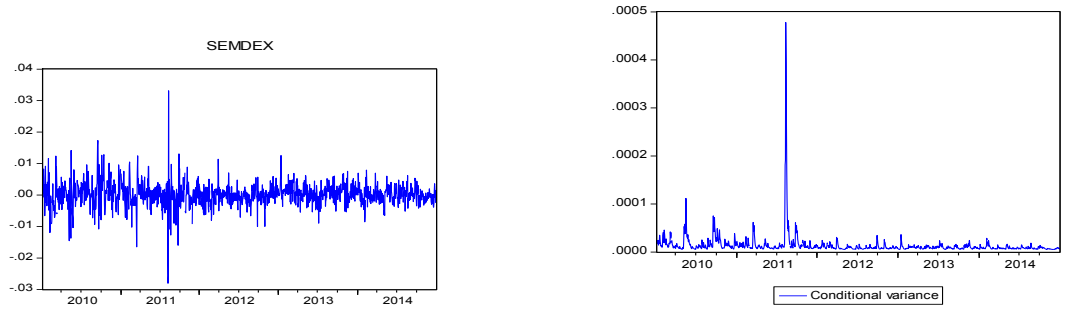


Figure 4.7- Mauritius stock Index: Change in the log of daily index prices and the daily volatility. The volatility is very low for this period of time. However, we observe a peak in 2011.

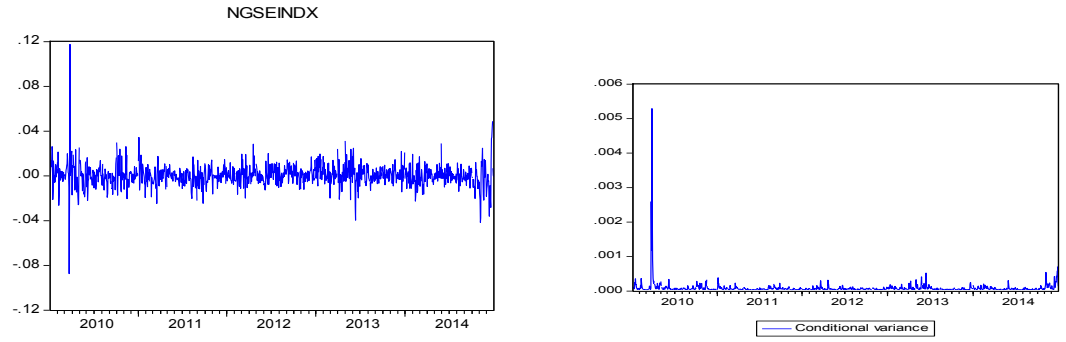


Figure 4.8 – Nigerian stock index: Change in the log of daily index prices and the daily volatility. The volatility is low, with a peak in 2010.

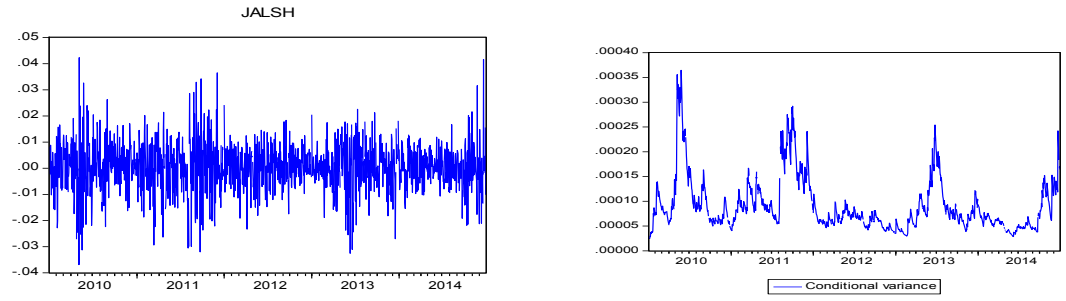


Figure 4.9 – South African stock index: Change in the log of daily index prices and the daily volatility. The volatility is frequent over all the period of time.

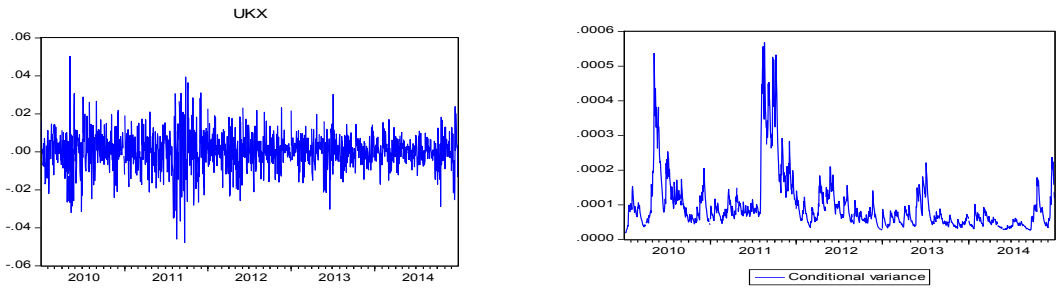


Figure 4.10 – UK stock index: Change in the log of daily index prices and the daily volatility.

The volatility is very important between 2010 and 2012.

The daily stock prices used in this paper is the daily closed prices from January 2010 to December 2014 consist of 1237 observations for IBOV; 1222 observations for BRVM; 1184 observations for EGX30; 1226 observations for NIKKEI225; 1285 for SEMDX; 1251 for MCSINDX; 1236 for NGSEINDX, 1254 for NSEAI; 1248 for JALSH and 1261 for UKX. It can be seen that the plots displayed above exhibit considerable volatility or swings in their returns over time. The bulges in the return graphs are the proof that volatility is time-varying. In most cases volatilities stay low but there are spikes with high volatilities that persist for a number of periods.

We can see that graphs JALSH, UKX and IBOV indicate more frequent oscillations but with a reasonable peak varying between 0-|0.04| for JALSH, 0-|0.05| for UKX and 0-|0.08|. Although the other plots do not show frequent variations, indexes such as NIKKEI, BRVM and EGX30 have fluctuations between |0.06| and |0.12|. In other words, those variations refer to the amount of uncertainty of risk about the size of changes in stock prices. Generally, the higher the volatility, the riskier the security and also the riskier the security, the higher the yield.

The GARCH (1, 1) estimation used in this document is based on Gaussian distribution. The results obtain after the simulation have been displayed in the table below

Variables	Coefficient	Std. Error	z-Statistic	Prob.
IBOV				
C	8.85E-06	2.36E-06	3.747770	0.0002
RESID(-1)^2	0.075459	0.011720	6.438621	0.0000
GARCH(-1)	0.881391	0.019316	45.63059	0.0000
BRVM				
C	3.90E-05	3.83E-06	10.16989	0.0000
RESID(-1)^2	0.163495	0.028222	5.793165	0.0000
GARCH(-1)	0.219254	0.073050	3.001420	0.0027
EGX30				
C	2.16E-05	4.79E-06	4.517491	0.0000
RESID(-1)^2	0.209104	0.025723	8.129196	0.0000
GARCH(-1)	0.712109	0.032766	21.73307	0.0000
NIKKEI				
C	8.49E-06	2.41E-06	3.529232	0.0004
RESID(-1)^2	0.116316	0.013540	8.590657	0.0000
GARCH(-1)	0.843020	0.020268	41.59363	0.0000
NSEAISI				
C	1.29E-05	2.24E-06	5.764918	0.0000
RESID(-1)^2	0.263169	0.037748	6.971737	0.0000
GARCH(-1)	0.384426	0.083625	4.597015	0.0000

SEMDEX

C	1.85E-06	3.13E-07	5.920891	0.0000
RESID(-1)^2	0.224136	0.025051	8.947104	0.0000
GARCH(-1)	0.631551	0.038360	16.46380	0.0000

MCSINDX

C	9.14E-06	1.68E-06	5.431060	0.0000
RESID(-1)^2	0.183439	0.030201	6.073854	0.0000
GARCH(-1)	0.592494	0.059891	9.892869	0.0000

NGSEINDEX

C	2.45E-05	2.77E-06	8.843823	0.0000
RESID(-1)^2	0.350991	0.025609	13.70563	0.0000
GARCH(-1)	0.371116	0.051042	7.270863	0.0000

JALASH

C	2.04E-06	6.28E-07	3.242350	0.0012
RESID(-1)^2	0.079811	0.013919	5.733989	0.0000
GARCH(-1)	0.899702	0.017557	51.24457	0.0000

UKX

C	3.26E-06	7.65E-07	4.258780	0.0000
RESID(-1)^2	0.126651	0.019210	6.593023	0.0000
GARCH(-1)	0.842146	0.021743	38.73220	0.0000

Since all p-values are small (less than 0.05), all GARCH parameters are significant. GARCH > ARCH means that there is a reasonably long persistence of volatility.

The coefficients of the lagged squared residual and lagged conditional variance parameters from the conditional variance equation are highly significant. Often the GARCH term (β) is close to 0.9, this implies that the variations of the conditional variance away from its long-run mean last a long time. Given this importance of β, it is obvious that high values of σ^2_{t-1} will imply high values of σ^2_t and vice versa. In this case, all indexes present volatility signs. The Johannesburg and Brazilian stock indexes appear to be the most volatiles markets, followed respectively by the UK stock index, Japanese stock index and Egyptian stock index because of their GARCH term close to 0.9. In addition, the sum of the coefficients on the lagged squared error and lagged conditional variance is very close to 1. This could be explained by the conditional variance that is highly persistent. A large sum of coefficients signifies that a large positive (or negative) return will imply a high forecasted variance for a protracted period.

The study of stock indexes using Delta-normal VaR and GARCH (1, 1) models provides a detailed analysis of equity markets volatility included in the sample. As we can see the most volatile markets are IBOV, JALASH, NIKKEI, UKX and EGX30. We confirm the thought of authors like Bekaert and Harvey (2000) that assert that emerging equity markets always present volatility features. This example shows the evidence with Brazil and South African stock indexes that have recurrent fluctuations, but reasonable variation interval. On the Other hand, we observe a very important variation interval in Japanese stock index.

Note that, the volatility in a market can be explained by various social, economic and political factors that might impact them. For industrial countries such as the UK and Japan, the period 2010 -2014 is situated after the recent financial crisis that affected western countries. For example in this timeline, Quantitative Easing and tapering processes

have been initiated to mitigate the effects of the crisis. The immediate consequences on exchange rate, interest rate and inflation have place pressure on stocks. For African countries like Cote d'Ivoire and Egypt, this period was link to political turmoil and civil war that might also have affected the markets.

Moreover, volatility is also a sign of higher returns and intense activity in markets. African markets (with the exception of South Africa, Nigeria and Egypt) show low volatility because they are too small and have less trading instruments.

5.0 – RECOMMENDATIONS

Luckily, environments suitable to the growth economy through capital markets development are taking root in Africa. This study includes other countries in the sample in order to enable comparisons. The difference in size immediately appears. There are many obstacles that inhibit the development of African capital markets such as the weak economic environment, small size, lack of liquidity and domestic participation. Indeed, Africa financial markets might be better if governments were seriously involved in creating adequate and flexible regulatory structure to prevent and control fraud in trading process. In other words, professional and consistent clearance and settlement procedures are what investors need the most. Moreover, they can also enhance the easy access for accurate information to motivate foreign investors.

Strategies must be found to encourage local participation in the sophisticated banking services, insurance products and other financial market schemes by including financial markets courses in schools and universities programmes. This can facilitate the comprehension and the importance of capital market development for the general interest. Banks should ease the bank account opening process to encourage the population to save.

There is a need to develop bond markets (in local currency) to limit the continent external dependence. Existing markets should introduce new financial instruments such as derivatives to mitigate risk effects.

The most important factors remain the political stability without which any financial transactions cannot take place. African nations must cultivate peace and put their countries' interests first in order to accelerate the development that has known severe delays.

In addition, healthy financial atmosphere may optimize AFDB's actions within the region. It would be easier to get funds from local markets rather than seek external supports.

6.0 – CONCLUSION

Since the late 1990s, a number of African nations have instituted organised stock exchanges, mainly to create a propitious environment for capital growth and also to take part in the financial globalisation. The objective of this dissertation was twofold. It may be considered as a modest contribution on the role of capital market development in the economic growth and in the other hand the examination of market risk and volatility of some stock indexes with a particular emphasis put on AFDB regional and non regional member countries. This particular interest for African countries is not fortuitous. In fact, despite their small size, lack of liquidity and other social and political factors that might impact those markets, African economies are currently expanding with annual growths in the range of 5 to10% and represent worldwide funds new destination for investment opportunities.

The sample consisted of 7 African countries: Cote d'Ivoire, Egypt, Kenya, Mauritius, Morocco, Nigeria and South Africa; 2 advanced countries: United Kingdom and Japan; 1 South American emerging country: Brazil. We applied a time series and panel data analysis using stock market development (liquidity and size) variables and the current gross

domestic product over the period 1991-2012. We tried different equations in order to provide accurate conclusions. First of all, the panels 1and 2 demonstrate that stock market development spurs economic growth since we found market capitalization and turnover ratio significant and positively correlated with GDP (panel 2), and Listed domestic companies significant, but negatively correlated with GDP (panel 1 and 2). Secondly, the time series analysis using also 2 different equations made us accept automatically the null hypothesis for United Kingdom and Cote d'Ivoire, both equations combined. The null hypothesis can be accepted for Nigeria and South Africa in the regression 6; Brazil and Mauritius in regression 7 because no variable was found significant, and rejected for Egypt and Japan. On the other hand, regression 6 concludes that Japan, Kenya and Morocco economic growth is positively affected by their stock market capitalizations, Brazil and Mauritius' economies are positively correlated with stock total value while turnover ratio is positively linked with Egypt's GDP. In the regression 7, we rejected the null hypothesis for Egypt, Japan, Kenya, Morocco, Nigeria and South Africa because we found one or more significant variables. In general, Market capitalization and turnover ratio are the most significant and positively correlated with GDP while stock traded ratio and listed domestic companies are significant in some cases, and negatively correlated with GDP. However, both equations combined, market capitalization and turnover ratio are significant for Kenya; market capitalization and total value ratio for Nigeria and South Africa. In reality, every country has its own features, this is why it is hard to find a solid conclusion for this issue, for instance in countries with small and almost inexistence stock markets, the economic growth relies on other pillars.

In general, stock markets development can play a great role in financial growth if efficient policies are elaborated in African nations in order to moderate size and liquidity issues.

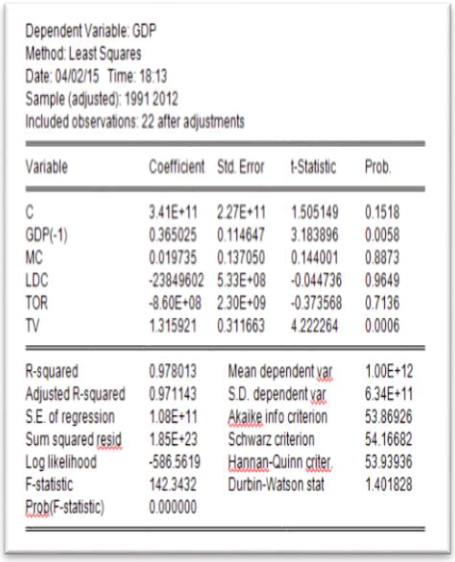
We also investigated the Value at Risk and volatility of the same countries stock indexes (MCSINDEX index (Morocco), NSEAI index (Kenya), JALSH index (South Africa) , NGSEINDEX (Nigeria), ICXCOMP (BRVM), SEMDEX (Mauritius), UKX (UK), IBOV (Brazil), NIKKEI225 (Japan) and EGX30 (Egypt)) using delta-normal VaR and GARCH (1,1). The result of value at risk showed that EGX30, NIKKEI225 and IBOV are more likely to lose a huge percentage of money since their standard deviation and VaR (95% and 99%) are higher compared to the others. Moreover, GARCH (1,1) approach based on daily price of the period 2010-2014 has concluded that JASLH, IBOV, NIKKEI225 and UKX are the most volatile stock indexes as the GARCH term is closed to 0.9.

Furthermore, the period of higher variations in returns might be linked to particular social, financial and political events happening in the world or in the countries where the stock exchange is located. For instance, the recent financial crisis and its short and long term drawbacks, the Euro zone crises and its impact on African countries, the civil war and political turmoil in Cote d'Ivoire and Egypt…Volatility signs can be an indicator of important transactions in the stock markets, this is illustrated by the small fluctuations of some African Stock indexes that remain small and illiquid. Further research might look at African bond and derivative markets which are also crucial for any financial markets at the moment.

7.0 - APPENDICES

Figure 5 - Eviews time series and panel data analysis Results

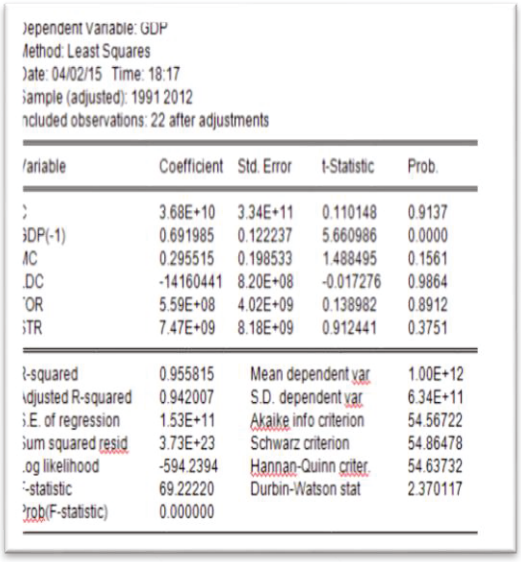
Regressions 6 *Regressions 7*



Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 18:13
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.41E+11	2.27E+11	1.505149	0.1518
GDP(-1)	0.365025	0.114647	3.183896	0.0058
MC	0.019735	0.137050	0.144001	0.8873
LDC	-23849602	5.33E+08	-0.044736	0.9649
TOR	-8.60E+08	2.30E+09	-0.373568	0.7136
TV	1.315921	0.311663	4.222264	0.0006

R-squared	0.978013	Mean dependent var	1.00E+12
Adjusted R-squared	0.971143	S.D. dependent var	6.34E+11
S.E. of regression	1.08E+11	Akaike info criterion	53.86926
Sum squared resid	1.85E+23	Schwarz criterion	54.16682
Log likelihood	-586.5619	Hannan-Quinn criter.	53.93936
F-statistic	142.3432	Durbin-Watson stat	1.401828
Prob(F-statistic)	0.000000		

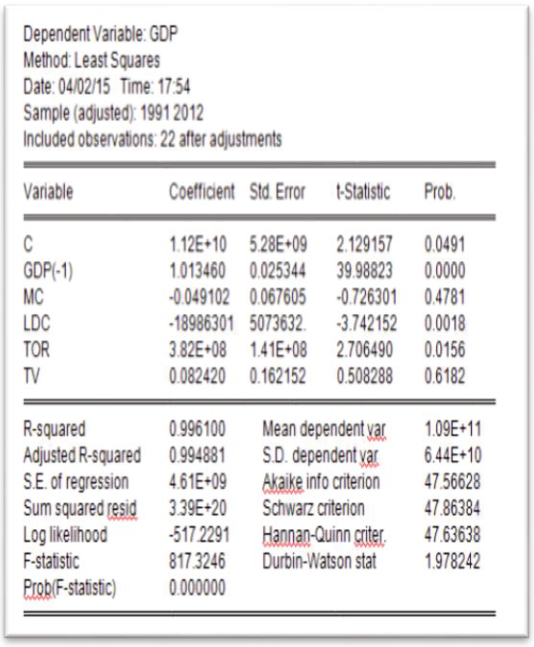


)ependent Variable: GDP
Method: Least Squares
)ate: 04/02/15 Time: 18:17
Sample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

/ariable	Coefficient	Std. Error	t-Statistic	Prob.
;	3.68E+10	3.34E+11	0.110148	0.9137
GDP(-1)	0.691985	0.122237	5.660986	0.0000
MC	0.295515	0.198533	1.488495	0.1561
.DC	-14160441	8.20E+08	-0.017276	0.9864
'OR	5.59E+08	4.02E+09	0.138982	0.8912
STR	7.47E+09	8.18E+09	0.912441	0.3751

R-squared	0.955815	Mean dependent var	1.00E+12
djusted R-squared	0.942007	S.D. dependent var	6.34E+11
S.E. of regression	1.53E+11	Akaike info criterion	54.56722
Sum squared resid	3.73E+23	Schwarz criterion	54.86478
.og likelihood	-594.2394	Hannan-Quinn criter.	54.63732
-statistic	69.22220	Durbin-Watson stat	2.370117
Prob(F-statistic)	0.000000		

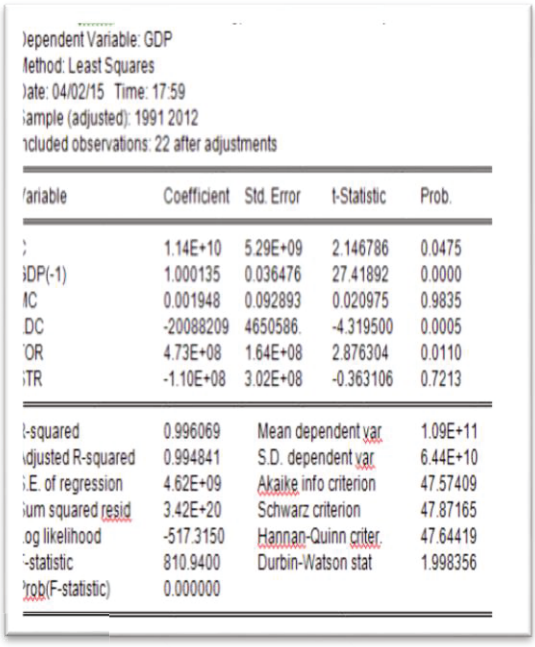
1- *Brazil*



Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 17:54
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.12E+10	5.28E+09	2.129157	0.0491
GDP(-1)	1.013460	0.025344	39.98823	0.0000
MC	-0.049102	0.067605	-0.726301	0.4781
LDC	-18986301	5073632.	-3.742152	0.0018
TOR	3.82E+08	1.41E+08	2.706490	0.0156
TV	0.082420	0.162152	0.508288	0.6182

R-squared	0.996100	Mean dependent var	1.09E+11
Adjusted R-squared	0.994881	S.D. dependent var	6.44E+10
S.E. of regression	4.61E+09	Akaike info criterion	47.56628
Sum squared resid	3.39E+20	Schwarz criterion	47.86384
Log likelihood	-517.2291	Hannan-Quinn criter.	47.63638
F-statistic	817.3246	Durbin-Watson stat	1.978242
Prob(F-statistic)	0.000000		



)ependent Variable: GDP
Method: Least Squares
)ate: 04/02/15 Time: 17:59
Sample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

/ariable	Coefficient	Std. Error	t-Statistic	Prob.
;	1.14E+10	5.29E+09	2.146786	0.0475
GDP(-1)	1.000135	0.036476	27.41892	0.0000
MC	0.001948	0.092893	0.020975	0.9835
.DC	-20088209	4650586.	-4.319500	0.0005
'OR	4.73E+08	1.64E+08	2.876304	0.0110
STR	-1.10E+08	3.02E+08	-0.363106	0.7213

-squared	0.996069	Mean dependent var	1.09E+11
djusted R-squared	0.994841	S.D. dependent var	6.44E+10
S.E. of regression	4.62E+09	Akaike info criterion	47.57409
Sum squared resid	3.42E+20	Schwarz criterion	47.87165
.og likelihood	-517.3150	Hannan-Quinn criter.	47.64419
-statistic	810.9400	Durbin-Watson stat	1.998356
Prob(F-statistic)	0.000000		

2- *Egypt*

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 18:03
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.80E+09	2.30E+09	1.217641	0.2410
GDP(-1)	0.701225	0.118847	5.900247	0.0000
MC	0.395869	0.332529	1.190479	0.2512
LDC	40349322	59877539	0.673864	0.5100
TOR	-5.95E+08	3.68E+08	-1.615239	0.1258
TV	16.56128	9.350023	1.771256	0.0956

R-squared	0.968979	Mean dependent var	1.56E+10
Adjusted R-squared	0.959284	S.D. dependent var	5.98E+09
S.E. of regression	1.21E+09	Akaike info criterion	44.88741
Sum squared resid	2.33E+19	Schwarz criterion	45.18497
Log likelihood	-487.7615	Hannan-Quinn criter.	44.95751
F-statistic	99.95437	Durbin-Watson stat	1.688600
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 18:07
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.11E+09	2.46E+09	1.263495	0.2245
GDP(-1)	0.724253	0.128766	5.624586	0.0000
MC	0.484152	0.373171	1.297401	0.2129
LDC	18741460	62603310	0.299369	0.7685
TOR	-7.06E+08	5.54E+08	-1.275496	0.2203
STR	3.41E+09	2.96E+09	1.150612	0.2668

R-squared	0.965731	Mean dependent var	1.56E+10
Adjusted R-squared	0.955022	S.D. dependent var	5.98E+09
S.E. of regression	1.27E+09	Akaike info criterion	44.98697
Sum squared resid	2.57E+19	Schwarz criterion	45.28452
Log likelihood	-488.8566	Hannan-Quinn criter.	45.05706
F-statistic	90.17955	Durbin-Watson stat	1.756591
Prob(F-statistic)	0.000000		

3- *Cote D'Ivoire (Ivory Coast)*

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 17:40
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.76E+11	7.89E+11	-0.222580	0.8267
GDP(-1)	0.732747	0.142995	5.124272	0.0001
MC	0.322632	0.155222	2.078525	0.0541
LDC	1.89E+08	3.40E+08	0.554945	0.5866
TOR	8.09E+09	9.98E+09	0.810650	0.4295
TV	-0.270185	0.207661	-1.301088	0.2117

R-squared	0.758901	Mean dependent var	4.62E+12
Adjusted R-squared	0.683557	S.D. dependent var	6.28E+11
S.E. of regression	3.54E+11	Akaike info criterion	56.24738
Sum squared resid	2.00E+24	Schwarz criterion	56.54493
Log likelihood	-612.7211	Hannan-Quinn criter.	56.31747
F-statistic	10.07254	Durbin-Watson stat	1.419444
Prob(F-statistic)	0.000168		

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 17:44
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.21E+11	5.69E+11	0.740322	0.4698
GDP(-1)	0.597530	0.119101	5.016994	0.0001
MC	0.402081	0.108987	3.689275	0.0020
LDC	29281875	2.75E+08	0.106563	0.9165
TOR	1.56E+10	6.59E+09	2.365305	0.0310
STR	-1.92E+10	5.55E+09	-3.468824	0.0032

R-squared	0.847830	Mean dependent var	4.62E+12
Adjusted R-squared	0.800277	S.D. dependent var	6.28E+11
S.E. of regression	2.81E+11	Akaike info criterion	55.78716
Sum squared resid	1.26E+24	Schwarz criterion	56.08472
Log likelihood	-607.6588	Hannan-Quinn criter.	55.85726
F-statistic	17.82917	Durbin-Watson stat	1.708857
Prob(F-statistic)	0.000005		

4- *Japan*

Method: Least Squares
Date: 04/02/15 Time: 17:21
Sample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

ariable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.36E+10	8.34E+09	-1.631414	0.1223
GDP(-1)	0.834108	0.069565	11.99038	0.0000
MC	0.724813	0.249067	2.910116	0.0102
_DC	2.35E+08	1.42E+08	1.660430	0.1163
TOR	4.21E+08	2.57E+08	1.638524	0.1208
TV	-1.796474	2.572562	-0.698321	0.4950

R-squared	0.991342	Mean dependent var	2.01E+10
Adjusted R-squared	0.988637	S.D. dependent var	1.32E+10
S.E. of regression	1.41E+09	Akaike info criterion	45.19937
Sum squared resid	3.18E+19	Schwarz criterion	45.49693
Log likelihood	-491.1931	Hannan-Quinn criter.	45.26947
F-statistic	366.4213	Durbin-Watson stat	1.407902
Prob(F-statistic)	0.000000		

ependent Variable: GDP
ethod: Least Squares
ate: 04/02/15 Time: 17:25
ample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

ariable	Coefficient	Std. Error	t-Statistic	Prob.
	-1.20E+10	7.16E+09	-1.673598	0.1136
DP(-1)	0.765246	0.079074	9.677575	0.0000
C	0.891453	0.248698	3.584473	0.0025
DC	2.06E+08	1.25E+08	1.644502	0.1196
OR	7.90E+08	3.49E+08	2.263223	0.0379
TR	-1.72E+09	1.06E+09	-1.626565	0.1234

-squared	0.992345	Mean dependent var	2.01E+10
djusted R-squared	0.989952	S.D. dependent var	1.32E+10
.E. of regression	1.33E+09	Akaike info criterion	45.07637
um squared resid	2.82E+19	Schwarz criterion	45.37393
og likelihood	-489.8401	Hannan-Quinn criter.	45.14647
-statistic	414.8008	Durbin-Watson stat	1.611298
rob(F-statistic)	0.000000		

5- *Kenya*

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 17:08
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.57E+09	5.18E+08	3.029653	0.0080
GDP(-1)	0.760816	0.121230	6.275787	0.0000
MC	-0.037197	0.149054	-0.249552	0.8061
LDC	-2854383.	15462204	-0.184604	0.8559
TOR	-1.40E+08	73302527	-1.907102	0.0746
TV	7.508270	2.599250	2.888629	0.0107

R-squared	0.978143	Mean dependent var	5.98E+09
Adjusted R-squared	0.971312	S.D. dependent var	2.66E+09
S.E. of regression	4.51E+08	Akaike info criterion	42.91978
Sum squared resid	3.26E+18	Schwarz criterion	43.21734
Log likelihood	-466.1176	Hannan-Quinn criter.	42.98987
F-statistic	143.2046	Durbin-Watson stat	2.096327
Prob(F-statistic)	0.000000		

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 17:25
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.20E+10	7.16E+09	-1.673598	0.1136
GDP(-1)	0.765246	0.079074	9.677575	0.0000
MC	0.891453	0.248698	3.584473	0.0025
LDC	2.06E+08	1.25E+08	1.644502	0.1196
TOR	7.90E+08	3.49E+08	2.263223	0.0379
STR	-1.72E+09	1.06E+09	-1.626565	0.1234

R-squared	0.992345	Mean dependent var	2.01E+10
Adjusted R-squared	0.989952	S.D. dependent var	1.32E+10
S.E. of regression	1.33E+09	Akaike info criterion	45.07637
Sum squared resid	2.82E+19	Schwarz criterion	45.37393
Log likelihood	-489.8401	Hannan-Quinn criter.	45.14647
F-statistic	414.8008	Durbin-Watson stat	1.611298
Prob(F-statistic)	0.000000		

6- *Mauritius*

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 16:51
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.19E+10	8.33E+09	1.430372	0.1718
GDP(-1)	0.755294	0.119238	6.334344	0.0000
MC	0.295349	0.140375	2.103999	0.0515
LDC	-56804583	1.53E+08	-0.371459	0.7152
TOR	-43855485	1.11E+08	-0.396128	0.6972
TV	0.012490	0.308229	0.040520	0.9682

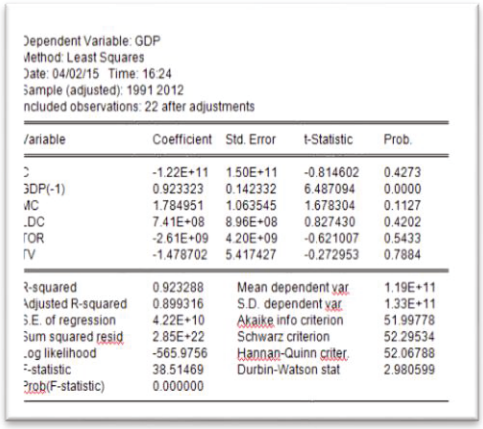
R-squared	0.978644	Mean dependent var	5.50E+10
Adjusted R-squared	0.971970	S.D. dependent var	2.41E+10
S.E. of regression	4.03E+09	Akaike info criterion	47.30039
Sum squared resid	2.60E+20	Schwarz criterion	47.59795
Log likelihood	-514.3043	Hannan-Quinn criter.	47.37049
F-statistic	146.6376	Durbin-Watson stat	2.030718
Prob(F-statistic)	0.000000		

ependent Variable: GDP
ethod: Least Squares
ate: 04/02/15 Time: 16:56
ample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

ariable	Coefficient	Std. Error	t-Statistic	Prob.
	1.11E+10	7.70E+09	1.442685	0.1684
DP(-1)	0.701554	0.135882	5.162948	0.0001
C	0.375654	0.165733	2.266624	0.0376
_DC	-25874193	1.45E+08	-0.178809	0.8603
OR	18267804	1.26E+08	0.144877	0.8866
TR	-1.83E+08	3.06E+08	-0.599495	0.5572

-squared	0.979111	Mean dependent var	5.50E+10
djusted R-squared	0.972583	S.D. dependent var	2.41E+10
.E. of regression	3.99E+09	Akaike info criterion	47.27828
um squared resid	2.55E+20	Schwarz criterion	47.57584
og likelihood	-514.0611	Hannan-Quinn criter.	47.34838
-statistic	149.9876	Durbin-Watson stat	2.068225
rob(F-statistic)	0.000000		

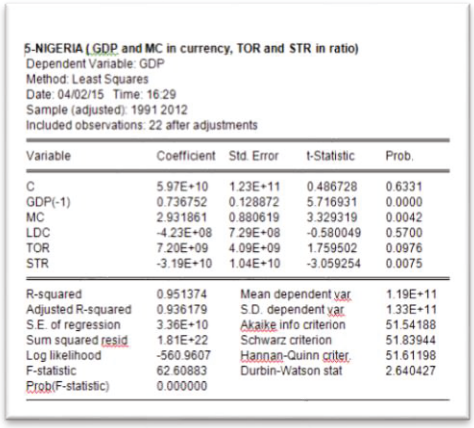
7- Morocco



)ependent Variable: GDP
Method: Least Squares
)ate: 04/02/15 Time: 16:24
Sample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

/ariable	Coefficient	Std. Error	t-Statistic	Prob.
;	-1.22E+11	1.50E+11	-0.814602	0.4273
3DP(-1)	0.923323	0.142332	6.487094	0.0000
MC	1.784951	1.063545	1.678304	0.1127
.DC	7.41E+08	8.96E+08	0.827430	0.4202
TOR	-2.61E+09	4.20E+09	-0.621007	0.5433
TV	-1.478702	5.417427	-0.272953	0.7884

R-squared	0.923288	Mean dependent var	1.19E+11
Adjusted R-squared	0.899316	S.D. dependent var	1.33E+11
S.E. of regression	4.22E+10	Akaike info criterion	51.99778
Sum squared resid	2.85E+22	Schwarz criterion	52.29534
Log likelihood	-565.9756	Hannan-Quinn criter.	52.06788
F-statistic	38.51469	Durbin-Watson stat	2.980599
Prob(F-statistic)	0.000000		

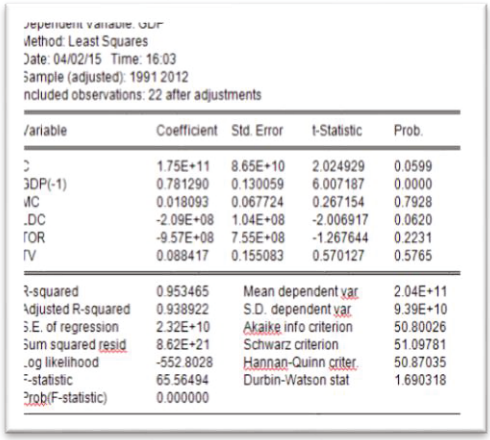


5-NIGERIA (GDP and MC in currency, TOR and STR in ratio)
Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 16:29
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.97E+10	1.23E+11	0.486728	0.6331
GDP(-1)	0.736752	0.128872	5.716931	0.0000
MC	2.931861	0.880619	3.329319	0.0042
LDC	-4.23E+08	7.29E+08	-0.580049	0.5700
TOR	7.20E+09	4.09E+09	1.759502	0.0976
STR	-3.19E+10	1.04E+10	-3.059254	0.0075

R-squared	0.951374	Mean dependent var	1.19E+11
Adjusted R-squared	0.936179	S.D. dependent var	1.33E+11
S.E. of regression	3.36E+10	Akaike info criterion	51.54188
Sum squared resid	1.81E+22	Schwarz criterion	51.83944
Log likelihood	-560.9607	Hannan-Quinn criter.	51.61198
F-statistic	62.60883	Durbin-Watson stat	2.640427
Prob(F-statistic)	0.000000		

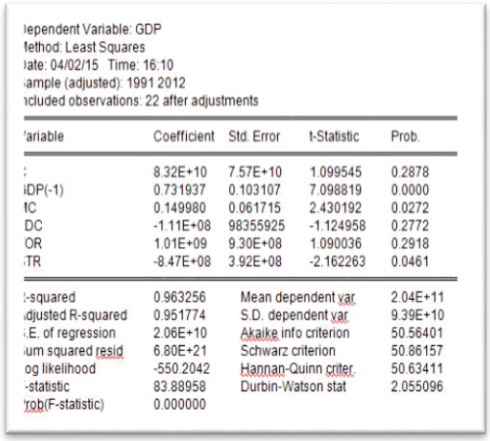
8- Nigeria



)ependent Variable: GDP
Method: Least Squares
)ate: 04/02/15 Time: 16:03
Sample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

/ariable	Coefficient	Std. Error	t-Statistic	Prob.
;	1.75E+11	8.65E+10	2.024929	0.0599
3DP(-1)	0.781290	0.130059	6.007187	0.0000
MC	0.018093	0.067724	0.267154	0.7928
.DC	-2.09E+08	1.04E+08	-2.006917	0.0620
TOR	-9.57E+08	7.55E+08	-1.267644	0.2231
TV	0.088417	0.155083	0.570127	0.5765

R-squared	0.953465	Mean dependent var	2.04E+11
Adjusted R-squared	0.938922	S.D. dependent var	9.39E+10
S.E. of regression	2.32E+10	Akaike info criterion	50.80026
Sum squared resid	8.62E+21	Schwarz criterion	51.09781
Log likelihood	-552.8028	Hannan-Quinn criter.	50.87035
F-statistic	65.56494	Durbin-Watson stat	1.690318
Prob(F-statistic)	0.000000		



lependent Variable: GDP
lethod: Least Squares
)ate: 04/02/15 Time: 16:10
ample (adjusted): 1991 2012
ncluded observations: 22 after adjustments

'ariable	Coefficient	Std. Error	t-Statistic	Prob.
;	8.32E+10	7.57E+10	1.099545	0.2878
iDP(-1)	0.731937	0.103107	7.098819	0.0000
IC	0.149980	0.061715	2.430192	0.0272
DC	-1.11E+08	98355925	-1.124958	0.2772
OR	1.01E+09	9.30E+08	1.090036	0.2918
TR	-8.47E+08	3.92E+08	-2.162263	0.0461

-squared	0.963256	Mean dependent var	2.04E+11
djusted R-squared	0.951774	S.D. dependent var	9.39E+10
E. of regression	2.06E+10	Akaike info criterion	50.56401
um squared resid	6.80E+21	Schwarz criterion	50.86157
og likelihood	-550.2042	Hannan-Quinn criter.	50.63411
-statistic	83.88958	Durbin-Watson stat	2.055096
rob(F-statistic)	0.000000		

9- South Africa

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 18:21
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.52E+10	5.30E+11	-0.123110	0.9036
GDP(-1)	0.421413	0.237961	1.770933	0.0956
MC	0.193586	0.173528	1.115589	0.2811
LDC	1.47E+08	2.82E+08	0.520405	0.6099
TOR	9.22E+09	7.72E+09	1.193355	0.2501
TV	-0.159220	0.195977	-0.812444	0.4285

R-squared	0.875160	Mean dependent var	1.97E+12
Adjusted R-squared	0.836147	S.D. dependent var	6.93E+11
S.E. of regression	2.80E+11	Akaike info criterion	55.78347
Sum squared resid	1.26E+24	Schwarz criterion	56.08103
Log likelihood	-607.6182	Hannan-Quinn criter.	55.85356
F-statistic	22.43280	Durbin-Watson stat	1.447110
Prob(F-statistic)	0.000001		

Dependent Variable: GDP
Method: Least Squares
Date: 04/02/15 Time: 18:24
Sample (adjusted): 1991 2012
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.88E+10	4.97E+11	0.158494	0.8761
GDP(-1)	0.466021	0.282022	1.652427	0.1179
LDC	1.57E+08	2.87E+08	0.545026	0.5933
MC	0.164130	0.225861	0.726685	0.4779
TOR	6.68E+09	8.89E+09	0.751281	0.4634
STR	-3.02E+09	7.33E+09	-0.411680	0.6860

R-squared	0.871372	Mean dependent var	1.97E+12
Adjusted R-squared	0.831176	S.D. dependent var	6.93E+11
S.E. of regression	2.85E+11	Akaike info criterion	55.81336
Sum squared resid	1.30E+24	Schwarz criterion	56.11091
Log likelihood	-607.9469	Hannan-Quinn criter.	55.88345
F-statistic	21.67799	Durbin-Watson stat	1.338432
Prob(F-statistic)	0.000001		

10- United Kingdom

Panel 1: Regression 8

Dependent Variable: GDP
Method: Panel Least Squares
Date: 04/02/15 Time: 19:23
Sample (adjusted): 1991 2012
Periods included: 22
Cross-sections included: 10
Total panel (balanced) observations: 220

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.62E+09	1.58E+10	-0.291865	0.7707
GDP(-1)	0.889038	0.024132	36.84105	0.0000
MC	0.179641	0.033792	5.316061	0.0000
LDC	-81895390	23100101	-3.545239	0.0005
TOR	1.20E+09	5.94E+08	2.013420	0.0453
TV	-0.027748	0.019601	-1.415661	0.1583

R-squared	0.988982	Mean dependent var	8.13E+11
Adjusted R-squared	0.988725	S.D. dependent var	1.45E+12
S.E. of regression	1.54E+11	Akaike info criterion	54.38737
Sum squared resid	5.09E+24	Schwarz criterion	54.47992
Log likelihood	-5976.611	Hannan-Quinn criter.	54.42475
F-statistic	3841.734	Durbin-Watson stat	1.680709
Prob(F-statistic)	0.000000		

Panel 2: Regression 9

Dependent Variable: GDP
Method: Panel Least Squares
Date: 04/02/15 Time: 19:05
Sample (adjusted): 1991 2012
Periods included: 22
Cross-sections included: 10
Total panel (balanced) observations: 220

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.81E+09	1.45E+10	0.330485	0.7414
GDP(-1)	0.889688	0.027059	32.88007	0.0000
MC	0.156437	0.031878	4.907397	0.0000
LDC	-68062886	32890786	-2.069360	0.0397
TOR	5.66E+08	4.25E+08	1.331813	0.1843
STR	14226619	34359241	0.414055	0.6792

R-squared	0.988888	Mean dependent var	8.13E+11
Adjusted R-squared	0.988628	S.D. dependent var	1.45E+12
S.E. of regression	1.55E+11	Akaike info criterion	54.39589
Sum squared resid	5.13E+24	Schwarz criterion	54.48845
Log likelihood	-5977.548	Hannan-Quinn criter.	54.43327
F-statistic	3808.777	Durbin-Watson stat	1.608400
Prob(F-statistic)	0.000000		

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